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OF

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APRIL, 1843.

ART. I.—ON CIMICIFUGA RACEMOSA.

By Joshua S. Jones.

(An Inaugural Essay.)

Cimicifuga Racemosa or Actæa Racemosa, (from the Greek *akte*, the elder bush, from a supposed resemblance in the foliage,) is commonly called Black Snake Root, or Cohosh. The plant belongs to the class and order Polyandria, Monogynia.

Generic Characters.—Calyx of four caducous sepals; petals four to eight or ten, sometimes wanting, caducous; carpels many seeded, dry and dehiscent or berry-like, and not opening; herbaceous; leaves decompound; flowers, in terminal racemes.

Natural order, Ranunculaceæ.

Specific Characters.—Leaves ternately decompound; leaflets ovate, oblong; racemes compound; virgate pedicils slender; petals minute; carpels dry, opening with two valves.

Description.—Root perennial, large, branching; stem four to six feet high, slender, smooth, naked, and towards

the summit leafy, near the middle with one to two radical leaves on long erect petioles; leaves triternate, petiolate; leaflets two to four inches long, and one to two inches wide, ovate, oblong, acute or acuminate, nearly smooth, unequally incised, dentate; teeth acuminate, the terminal leaflet larger, often three-lobed ; racemes terminal and subterminal, six to twelve inches long, many flowered ; pubescent; pedicils about one-third of an inch long, sometimes in pairs or branched, each with a short subulate bract at base; sepals roundish, ovate, concave, greenish white, cadaceous; petals four, white, very small, oblong, pedicellate, bifurcate at apex ; stamens numerous, white, twice as long as the ovary; fruit ovoid, somewhat compressed, dry and capsular, obliquely beaked by the short, thick, persistent style.

Habitat.—Rich woodlands; common throughout the United States. Flowers in June and July ; and the fruit ripens in September.

Observations.—The white racemes of this plant when in flower are quite conspicuous in our woodlands. The plant itself has a heavy, disagreeable odor when bruised ; the root is somewhat mucilaginous and astringent, and is a very popular medicine both for man and beast; it is used in infusion or decoction, chiefly as a pectoral remedy for human patients.

Sensible Properties.—The part of this plant used is the root, which should be dug up in July while the plant is in flower, washed clean, and dried in the shade. It is packed usually in small square bundles, and is brought into market chiefly by the Shaker Society of New Lebanon. It is composed of a head or caudex from one-third of an inch to one inch in thickness, two or three inches long; rough and knotty, caused by the remains of the stem of successive years. Externally it is of a dark brown, approaching to black ; internally whitish, breaking with a short fracture. Many radical fibres are given off in all directions ; the fibres are lighter co-

lored than the main root; it is with difficulty reduced to powder. Taste mucilaginous, bitter, and somewhat astringent, leaving a sense of acrimony in the mouth; it has a feeble odor, scarcely perceptible in the dried root; it yields its virtues to boiling water, ether, and partially to alcohol.

Medical Properties.—Black Snake Root has a tonic power united with that of a stimulating property; it has been used with much success by Doctor Young and Doctor Physick, in cases of chorea. It is chiefly used in domestic practice, in rheumatism, dropsy and various affections of the lungs, more particularly those resembling consumption. It has the property of stimulating the secretions, particularly those of the skin and kidneys.

Forms of Administration.—These are the powder, the dose of which is ten to fifteen grains; the infusion, made by pouring a pint of boiling water on one ounce of the bruised root, to be taken in the dose of a wine glass full when cold. A decoction has been recommended, but I think this mode is objectionable on account of the volatilization of the oil, and the insoluble apotheme which precipitates on cooling.

CHEMICAL CONSTITUTION.

Experiment 1*st.*—A decoction was made by boiling one ounce of the bruised root in a pint of water for fifteen minutes, and filtered; this was of a deep brown color. After standing a short time, a precipitate of a grayish-white color was deposited, which consisted of gum and starchy matters. With this decoction, iodine struck a deep blue tinge; gelatin produced a curdy white precipitate ; sulph. acid also produced a white precipitate. To a portion of this decoction subacetate lead was added as long as any precipitate was formed. A stream of sulphuretted hydrogen was passed into the solution to precipitate the excess of lead; it was then filtered and boiled. The solution was evaporated to the consistence of an extract, and repeatedly washed, but nothing definite could be obtained.

Experiment 2d.—An alcoholic tincture was made by macerating two ounces of the dried root in eight ounces of alcohol for fourteen days, and filtered, it was of a deep wine color. It had a bitter and nauseous taste. Upon adding water to a portion of it, a slight curdiness was perceptible. Per sulphate of iron produced a dense bluish black precipitate; upon evaporating a portion of this tincture it separated into two parts; first, a resin of a deep red color, the other soluble in alcohol and ether, not soluble in water. It was repeatedly washed with alcohol and ether, and after evaporation there remained a greasy oleaginous matter.

Experiment 3d.—An etherial tincture was made by macerating two ounces of the dried root in eight ounces of sulph. ether and filtered. It was of a light brown color, a bitter and disagreeable taste. Upon evaporation this also separated into two parts; first, a fixed oil of the consistence of thin syrup, of a deep brown color, and of bitter and astringent taste, leaving a disagreeable impression in the mouth and fauces for some time. It had an unctuous feel, and when dropped upon paper it left a permanent greasy stain. Second, upon further evaporation it yielded a waxy matter in connexion with a black coloring matter.

Experiment 4th.—A portion of the dried root was finely powdered, and moistened with warm water and subjected to heavy pressure. Some gummy matter was pressed out. This was treated with sulph. ether, but no oil could be detected. From which it is inferred that it contains oil in small amount.

Experiment 5th.—A portion of the fresh root was distilled with water; the product was a volatile oil, which came over mingled with the water, and upon standing a short time a small quantity of oil appeared at the bottom of the receiver, which was carefully removed; it possessed a peculiar odor, somewhat aromatic, and a sweet and agreeable taste; it was of a dirty white color, heavier than water and soluble in alcohol. A small portion was dropped upon

paper; it gave a semi-transparent appearance, but when exposed to the action of heat the oil was volatilized, and the paper left unstained. The water of distillation was highly impregnated with the odor and taste of the oil.

Experiment 6th.—Four hundred and eighty grains of the dried root were incinerated, and twenty grains of grayish white ashes were obtained, which were lixivated with boiling water; the filtered liquor had an alkaline taste, and restored the color of litmus previously reddened by an acid. It was neutralized with nitric acid, and spontaneously evaporated it yielded a mass of crystals possessing all the properties of nitrate of potassa.

Experiment 7th.—To the residue of experiment No. 6, dilute nitric acid was added and filtered with this solution. Ferrocyanate of potassa gave a dense blue precipitate; oxylate of ammonia produced a white precipitate.

Experiment 8th.—A portion of the fresh root was bruised into a pulp with water, the liquid was pressed out and the pulp boiled in alcohol. The solution was mixed with water and the spirit driven off by heat, but nothing was observed floating on the surface of the remaining liquid.

From the foregoing experiments the following are believed to be the constituents : Lignin, gum, starch, tannin, resin, gallic acid, fatty matter, fixed oil, wax, black coloring matter, volatile oil, salts of magnesia, potassa, iron and lime.

ART. II.—OBSERVATIONS ON SYRUP OF SARSAPARILLA.

By Thomas J. Husband.

(*Read at the Pharmaceutical Meeting of the College March* 6, 1843.)

Few medicines of such undoubted remedial powers, as are now justly conceded to belong to Sarsaparilla, have undergone so many changes in reputation. Perhaps at no period has it been more highly esteemed in this country, than at the present time. The improved formulæ for its different preparations in the U. S. Pharmacopœia of 1830, which have been observed generally by the Pharmaceutists of this city, for the past ten or twelve years, has no doubt been the means of elevating its character in the view of the medical profession, as one of our most valuable remedies in a variety of diseases. A fear that through the same channel of authority, its good character is about to be in some measure destroyed, has induced me to perform a series of experiments, for the purpose of testing the value of the new process for extracting its active properties, which has been proposed in the late edition of the Pharmacopœia, and adopted by some apothecaries; that of displacement with cold water. Having lately had occasion to prepare some Syrup of Sarsaparilla, I pursued carefully this plan, and although it yielded a syrup highly colored, and beautiful in appearance, it certainly possessed less of the peculiar acrimonous taste that characterizes all efficient preparations of this root, than is usually observed in the syrup prepared with diluted alcohol.

No. 1. Four ounces of Sarsaparilla, well bruised and macerated for twenty-four hours, was carefully treated with water by the displacement process, until the last portions of it acquired but little color. The infusion thus obtained,

amounting to two pints, was of dark color, and when concentrated by evaporation, with a moderate heat to four fluid ounces, formed a fluid extract, strongly impregnated with the peculiar taste of sarsaparilla. Eight ounces of diluted alcohol were then added to the remaining root, and macerated for twelve hours, when one pint of tincture was passed, or displaced, by further additions of diluted alcohol. This tincture was without much color, but possessed in a marked degree the peculiar taste of sarsaparilla. When evaporated to four fluid ounces, it yielded a fluid extract, richly endowed with the active principles of the root.

No. 2. Four ounces of Sarsaparilla, thoroughly bruised, and digested in two pints of water, at a temperature of about 180°, for two hours, was treated by displacement, with sufficient hot water to yield four pints of infusion ; the funnel being so arranged as to preserve the temperature of 180° during the percolation of the liquid. It was then evaporated to twenty-two fluid ounces, and set aside for twelve hours.

A floculent precipitate subsided, which was collected on a filter, treated with boiling alcohol and animal charcoal, for a few minutes, and passed through a filter while hot. It was then concentrated by evaporation and set aside. When cold, the alcohol was rendered opaque, with a white floculent precipitate. The evaporation being continued nearly to dryness, by a water bath, the residuum was treated with boiling water, and filtered while hot. This presented a milky aspect, and had a very bitter, nauseous, and acrid taste. No deposit occurring by allowing it to become cold, it was concentrated by evaporation, and set aside for several hours, when there appeared on the surface of the liquid an oily substance, having a nauseous acrid taste, with a strong odor of the root; a substance also subsided having the sensible properties ascribed to sarsaparillin, or the active principle of sarsaparilla. The infusion of twenty-two fluid ounces was subsequently evaporated to eleven fluid

ounces, (the proper degree of concentration for adding sugar to form the syrup,) and set aside for several hours, when there subsided a further precipitate, similar in every respect to that collected from the twenty-two fluid ounces. This infusion, on being reduced to four fluid ounces, formed an extract stronger in appearance than the aqueous one of experiment first. Sufficient alcohol to cover the root, remaining after treatment with water in experiment second, being poured on, and macerated for twelve hours, was subjected to displacement with diluted alcohol, until one pint of tincture passed. This was evaporated to four fluid ounces, thus yielding a fluid very sensibly marked with the bitterness and acrimony of the root.

No. 3. Four ounces of bruised sarsaparilla, macerated for twenty-four hours in diluted alcohol, and treated by displacement with sufficient of the same menstruum, until twenty-two fluid ounces of tincture passed, was evaporated to eleven fluid ounces, and set aside for twelve hours. Further additions of diluted alcohol were made to the root, and subsequently water, but neither liquid had much taste of sarsaparilla, the strength having been exhausted by the first process.

At the expiration of twelve hours, no deposit having occurred in the evaporated tincture, it was further reduced to four fluid ounces, and yielded a fluid extract very much stronger to the taste than either of those previously obtained. This extract was boiled for several hours, frequent additions of water being made to supply the waste. The preparation was evidently much weakened by the treatment, and the peculiar aroma that arose from the liquid at the commencement of the boiling, was entirely dissipated. The similarity of odor between this and the oily substance spoken of in experiment second, would seem to identify them ; and that part, at least, of the activity of the root is contained in this substance may be inferred from its sensible properties being characteristic of the taste of good sarsaparilla. The

opinion may be hazarded, that this peculiar substance represents the acrid property of the root, and is distinct from the bitterness that is believed to reside exclusively in the bitter principle of the root, or sarsaparillin.

From the foregoing experiments, I am induced to believe, that water, either cold or hot, is incompetent to exhaust the root of its acrid property, unless it is used in very large proportion. For by experiment 1, we see that the quantity directed by the Pharmacopœia for making cold infusion for syrup, is quite insufficient ; and by experiment 2, that even after the use of three times as much water as directed by the Pharmacopœia, at a temperature of 180°, a perceptible strength remained in the root.

From experiment 2, it appears that by the application of heat, even below the boiling point, some change takes place between the constituents of the root, so as to render insoluble in cold water or alcohol, principles that doubtless form its active properties. It is desirable, therefore, that in those preparations of this root, which are concentrated by evaporation, such a menstruum should be selected as would require the smallest quantity, and which would most rapidly evaporate at a moderate temperature.

In comparison with water, diluted alcohol is on these accounts decidedly preferable. By this also, the extraction of the strength of the root being more perfect, and no insoluble precipitate occurring by the requisite evaporation to lessen its activity, we have a concentrated solution of the active principles of the root, for forming either syrup or extract. Diluted alcohol is, therefore, free from all objection except the expense, and this should form no consideration when the strength of the preparation is injuriously affected by its disuse. This expense may, however, be in great measure avoided by distilling off the alcohol, which will then answer for further use.

Of all the writers and experimenters on the proper treatment of sarsaparilla, no one, perhaps, is more entitled to re-

spectful consideration, in a practical point of view, than Dr. Hancock, of the London Medico-Botanical Society. His residence in the country producing the genuine sarsaparilla, gave him many opportunities of studying its character, and after much apparent attention to the subject, he arrives at the conclusion, that it is essential to employ a vinous liquor to extract the strength of the root. The established custom of the country, as regards the preparations of sarsaparilla, is to use a vinous or fermented one. From the testimony of Dr. Hancock, the powerfully curative influence of the Spanish "Jarave," or fermented infusion, would seem to establish the efficacy of the solvent, though, perhaps, such a mode of preparation would illy accord with the more refined processes of the pharmaceutic art, of our day and time.

ART. III.—REPORT OF THE COMMITTEE TO WHOM WAS REFERRED THE PAPER OF THOMAS J. HUSBAND, ON SYRUP OF SARSAPARILLA.

The subject treated of in the paper may be resolved into a solution of the following query, viz.: What is the most efficient menstruum for extracting the activity of Sarsaparilla? The author after a series of well conducted experiments, arrives at the following conclusions:

1st. That diluted alcohol is fully adequate to the removal of all the activity from Sarsaparilla.

2d. That cold water is inadequate to wholly extract the virtues of that root, because, after its action, much acrimony remains, which can then be removed by diluted alcohol.

3d. That warm water, (180° Fahr.) when applied in large quantity, did not remove all the acrimony from the root.

And *lastly*. These premises being correct, the obvious impropriety of the *second formula* of the United States Pharmacopœia, which directs the employment of cold water, by displacement, as a means of making the syrup.

Before giving a detail of the results of their experiments, the Committee beg leave to make a few statements, drawn from prominent French authority, which have a direct bearing on the subject, and which will assist in its consideration.

Soubeiran states that Sarsaparilla contains, according to the best analyses, volatile oil, salseparine, bitter acrid resin, oily matter, extractive matter, starch, and albumen.

Salseparine is colorless, inodorous, crystallizes in radiated groups, and is a neutral substance. When dry it has only a slight taste, but its solution is acrid and a little bitter. It is a little soluble in cold water, more soluble in hot

water, and its solution possesses in a high degree the property of frothing by agitation, like soapy water. It is dissolved readily by cold alcohol, but to a greater extent when it is hot, the excess of salseparine separating by cooling.

Infusion of Sarsaparilla which is odorous and sapid, loses its odor and taste when boiled for a short time, which speaks little in favor of the decoction, (see Traite de Pharm., tome ii. p. 62.) Further, when Sarsaparilla is treated with water, it is easily deprived of its extractive matter, and, if we may judge from the coloration of the liquid, it is soon exhausted ; but after the root has ceased to color the menstruum, the fluid which passes possesses the power of frothing by agitation, which is due to the salseparine it contains, the latter substance having been but partially removed from the root by the first treatment. From this circumstance it is necessary to employ very considerable quantities of fluid, and hence the method of displacement does not present any advantages in the aqueous treatment of Sarsaparilla.

Both Soubeiran and Guibourt give the preference to a syrup made with the hydro-alcoholic extract, dissolved in water. Although a solution of that extract in water deposits salseparine by standing, yet when made into a syrup, Guibourt remarks that it takes a long time for even a small deposition to take place.

We will now detail our experiments, and it will be seen that they corroborate the statements above, as well as those of the paper referred for our consideration.

Six ounces of Sarsaparilla was obtained in coarse powder, by sifting from the ground root, composed principally of the cortical portion. One half of this was macerated in eight fluid ounces of water, for three days, and then subjected to displacement, until one pint of fluid was obtained. This infusion which possessed the peculiar odor of Sarsaparilla in a marked degree, was placed in a capsule, and suffered to evaporate at a temperature varying from 120°

to 150° Fahr., to the consistence of an extract, which we shall call No. 1.

The Sarsaparilla, when removed from the apparatus and dried, was found to still possess some acrimony when chewed, and was treated with diluted alcohol until eight fluid ounces of tincture were obtained, the latter yielding by evaporation a small quantity of dry resinous extract, No. 2.

The remaining three ounces of ground Sarsaparilla were macerated in eight fluid ounces of diluted alcohol for four days, and subjected to displacement until one pint of tincture was obtained. This was perfectly transparent; but when evaporated to six fluid ounces, a few grains of dark insoluble matter precipitated, which was separated by a filter, and the clear fluid evaporated to an extract, No. 3. The root which remained possessed no acrimony.

These different products were then carefully examined, with a view to their embodying the sensible properties of the Sarsaparilla, and the Committee, with others not of their number, agreed in the correctness of the following statements:

No. 1. This extract was translucent in thin layers, dark colored and very soluble in water. It possessed the odor, bitterness and acrimony of Sarsaparilla in a considerable degree ; and doubtless consisted of the extractive with more or less salseparine and volatile oil. This extract was more efficient than most of that in the shops.

No. 3. The extract prepared with diluted alcohol also had the odor of the root, but its taste was more bitter and acrid than No. 1, due to its containing all the acrid resin and salseparine of the quantity of root employed. It dissolved almost completely in water.

No. 2. This extract possessed the peculiar acrimony of Sarsaparilla more decidedly than either of the others, it being composed principally of acrid resin and salseparine, with some extractive.

One tenth of a grain of the extract No. 2, when agitated with half an ounce of water was sufficient, by long agitation, to convert all the fluid into froth. No. 3 possessed this character less than No. 2, and more than No. 1. This affords a means of judging approximatively as to the relative amount of salseparine contained in the three extracts.

The insoluble matter which precipitated during the evaporation of the tincture of Sarsaparilla, had but a very slight taste of that root, and hence the preparation is not weakened by its separation.

In making compound syrup of Sarsaparilla with diluted alcohol in the usual way, the resinous matter taken up by the menstruum from the guaiacum is nearly all precipitated, and if not separated subsequently gives the syrup an opaque appearance.

The Committee believe that if the Sarsaparilla was treated separately with diluted alcohol, and the residue with water, and the resulting tincture and infusion evaporated to the proper quantity, a more beautiful preparation would result equally efficient.

In reference to the second formula in the U. S. Pharmacopœia, the Committee would observe, that it is the same as that recommended by the committee of revision of the Philadelphia College of Pharmacy. That committee when engaged on the subject, concluded, from the results of experiments submitted to them at the time, that water was adequate to the extraction of the activity of Sarsaparilla, and that all those portions soluble in an alcoholic, and insoluble in a water menstruum, would be precipitated, when the alcohol was removed. This remark applies to the guaiacum, but to the Sarsaparilla only after standing for several days; for, although pure salseparine is but little soluble in water, yet the results of our experiments sufficiently prove that when its solution is effected by treating the root with a mixed menstruum, the alcohol may be removed by evaporation, without the salseparine immediately separating,

and the subsequent mixing of this solution with sugar, according to Guibourt, prevents it nearly altogether. This is probably owing to its association with substances which retard its crystallization, and the Committee believe that, owing to the same causes, cold water extracts and holds in solution more salseparine than if the same amount of that principle, in an isolated state, was submitted to its action. M. Beral, in a paper published several years since in the *Journal de Chimie Medicale*, strongly advocates the use of cold water as where heat is employed, the activity of the preparations suffer. (See American Journal of Pharmacy, vol. xii. p. 245.)

In conclusion, the Committee will observe that the syrup, carefully made with cold water as a menstruum, possesses in a very considerable degree the virtues of its ingredients, but they are convinced that diluted alcohol, employed as directed in the first formula of the U. S. Pharmacopœia, is the more eligible medium for its preparation, and in this they fully accord with the views contained in the paper referred for their consideration.

William Procter, Jr.
A. Duhamel,
Ambrose Smith.
} Committee.

April 3, 1843.

ART. IV.—REPORT ON RHUBARB.

Extract from the Minutes of the Trustees of the College of Pharmacy, New York. Feb. 2d, 1843.

"In accordance with the resolution of the Board of Trustees, passed at the meeting in January, the Committee of Inspection offer the present report on the specimen of Rhubarb then laid before the Board.

The very respectable house in whose possession the parcel was said to be, was waited upon by two of the members of the committee, and from one of that firm the following information was obtained. That the rhubarb in question was received by them direct from Canton, in half picul cases. That another house of equal respectability received another parcel by the same vessel, and that they had every reason to believe that it was the produce of China; that the whole quantity amounted to about thirty cases, and that a portion of it had been sold at various prices, from 30 to 45 cents per pound.

As there can be no doubt as to the channel by which it found its way to this market, the only question is whether it may be French or English rhubarb, which may have been sent to Canton, with an intention to deceive by a reshipment from that port, or whether it is really the production of China. The strong resemblance in appearance, odor, and taste, which it bears to poor samples of the root of European growth would naturally lead to the former conclusion, but it must be borne in mind that all the seeds from which rhubarb has been cultivated in Europe have originally been derived from China, and it is very possible that from a desire to preserve the market to themselves, the Chinese may have furnished to the Russians the seeds of a plant growing in that country of the same family, but not of

the variety which produces the article known in commerce as China Rhubarb, and valued in medicine for properties peculiar to it alone, and in consequence the specimen laid before the Board may be the root of this plant, identical with that now cultivated in Europe, which may have been sent into the market to make up the deficiency of the supply of the genuine article, which for some time past has been reported scarce.

It is generally supposed that we are still ignorant of the variety which produces the valuable article. Seivers, an apothecary, who was sent in 1790 to Bocharia, by the Russian government to obtain that information, relates that after four years travel he was unable to obtain any satisfactory results, and that no scientific person had at that time seen the true plant; he adds, 'all that is said by the Jesuits is miserable confused stuff, and all the seeds procured under its name are false; all the plantations we have will never yield true rhubarb, and I further declare that all the descriptions in all the Materia Medicas are incorrect.'

From some experiments as to its aperient effects, the committee feel themselves authorized to say, that it probably is not more than one quarter as strong as good Canton rhubarb, and as it makes a very handsome powder, they think the trade ought to be made acquainted with the fact of its being in the market, for very probably persons who wish to sell a low priced article will grind this root and offer it for sale under the assurance that it is real China Rhubarb, which assertion they would be enabled to make from the circumstances before mentioned." All of which is respectfully submitted by your

Committee of Inspection.

ART. V.—ON THE CEYLON CARDAMOM.

By Jonathan Pereira, M.D., F.R.S. and L.S.

The Scitamineous plant which bears the fruit known in commerce as the *Wild* or *Ceylon Cardamom*, and which is the produce of the island whose name it bears, has not hitherto, at least to my knowledge, been described by any botanist.

The account given by Bontius* of a plant which he calls the *Cardamomum majus* does not constitute any exception to this statement. For, in the first place, it is by no means clear that the fruit which he has figured is identical with our Ceylon Cardamom; and even admitting that it is, he must have fallen into some remarkable error with respect to its mother-plant, which, he says, is taller than a man, and has a flower like a hyacinth; and he gives a figure of it which represents a plant with a large, terminal, simple raceme. Now, neither his description nor his figure applies to the Ceylon Cardamom plant.

The hot acrid seeds known at the present day in this country, by the name of *Grains of Paradise*, are exclusively brought from the Western Coast of Africa, and are, in consequence, sometimes called *Guinea Grains*. The plant which yields them is said by Wildenow† to be a native of Ceylon, a statement which I shall presently prove to be erroneous.

The most recent writer on the Botany of Ceylon is Mr. Moon,‡ formerly Superintendent of the Botanic Garden of that island. This botanist mentions seven species of *Alpinia*, which are indigenous to, or cultivated in Ceylon. They

* Hist. Nat., p. 127.

† Species Plantarum, i., p. 9. Berolini, 1797.

‡ A Catalogue of the Indigenous and Exotic Plants growing in Ceylon. Colombo, 1824.

are *Alpinia Allughas, Galanga, nutans, sericea, calcarata, Cardamomum,* and *Granum Paradisi.* Of these, the two latter alone have any reference to the subject of this paper. His notices of them, excluding the Singhalese characters, are as follows :

♃ Alpinia Cardamomum, *Roxb.* Amomum repens, *Willd.* Cardamom, Kardumungu, *Portug.* Rata-ensal, *Singhalese.* Seeds esculent. *Roxb. Cor.* 3, t. 226. Kandy; cultivated. Rich mixed soil.

♃ Alpinia Granum Paradisi. Amomum Granum Paradisi, *Willd.* Ensal, *Singhalese.* Seeds esculent. *Rheed. Malab.* 11 t. 6. Kandy; cultivated. Rich mixed soil.

Moon's statement, that the Grain of Paradise plant was cultivated at Kandy, greatly surprised me, for I had previously ascertained that Grains of Paradise were not exported from Ceylon, and it appeared to me highly improbable that they should be wholly consumed in the island. Moreover, the omission of all notice of the plant yielding the Ceylon Cardamom (for it is well known that the *Alpinia Cardamomum* of Roxburgh is the Malabar Cardamom,) appeared to me most remarkable, and I concluded that there was some error in the names of the plants above referred to. It occurred to me that possibly the *Alpinia Granum paradisi* of Moon might, perhaps, be the Ceylon Cardamom. This notion was somewhat supported by the statement of Hermann,* that "*Ensal*" (the native name of Moon's Alpinia Granum paradisi) was the Singhalese name of Cardamom. Moreover, Gærtner† has figured the Ceylon Cardamom as the fruit called, by both Hermann and Burmann,‡ Ensal. I may observe, however, that the latter part of Gærtner's statement is not correct ; for Burmann distinctly says that Ensal is the "Cardamomum minus et vulgare" of Clusius,§

* Musæum Zeylanicum, p. 66. Ed. 2d. Lugd. Bat. 1726.

† De fructibus et seminibus plantarum.

‡ Thesaurus Zeylanicus, p. 54. Amstelæd. 1737.

§ Aromat. Hist., lib. i., cap. 24.

who has figured under this name the Small or Malabar Cardamom.

In order to test the acuracy of this notion, I referred to Rheede's figure, vol. ii., t. 6., quoted both by Linnæus* and Moon as the representation of the Grain of Paradise plant. But I was both disappointed and surprised to find that its fruit bore no resemblance either to the Ceylon Cardamom or to the capsule of the African grain of paradise. It followed, therefore, either that my suspicion was unfounded, or that the reference to Rheede's figure was erroneous.

When my former pupil, the late Mr. Frederick Saner, Assistant Surgeon in her Majesty's 61st regiment, was directed to proceed to Ceylon, I requested him to procure me specimens of the plants in question, with their accompanying fruits; and in order to establish their identity as completely as possible, I begged him to obtain specimens named by the Superintendent of the Botanical Garden in Ceylon. Unfortunately, however, before I had received any communication from him on the subject, he was prematurely cut off by dysentery; but some months afterwards his botanical collections and papers arrived in this country, and among them I found three species of *Alpinia* which had been supplied by Mr. Lear, the present Superintendent of the Botanical Garden at Ceylon, whose letter, stating the names of the species, I have now before me.

The first species was marked "*Alpinia (Amomum) Cardamomum. The finest species or true Cardamom.*" This specimen was in fruit, and was therefore easily recognised to be the Malabar Cardamom (*Elettaria Cardamomum* of Maton.)

The second species was marked "*Alpinia (Amomum) Granum paradisi. Grains of Paradise.*" This speci-

* Species Plantarum. Ed. 2d. Holmiæ. In the first edition of the Species Plantarum, Linnæus did not quote Rheede's figure.

men was also in fruit, and proved to be the *Wild* or *Ceylon Cardamom;* thus establishing the correctness of my suspicion that Moon's Grain of Paradise and our Ceylon Cardamom were identical.

The third species was marked "*Alpinia (Amomum) calcarata. Cardamom only used medicinally.*" With this I have nothing to do on the present occasion.

Linnæus, in his *Flora Zeylanica*, makes no mention of the Grain of Paradise plant (*Amomum Granum paradisi, Linn.*) In the first, second, and third editions of his *Species Plantarum*, published respectively in the years 1753, 1762, and 1764, he merely gives Madagascar and Guinea as the habitats of his Grain of Paradise plant ; so that he is free from the error, fallen into by some of his successors, of regarding this plant as a native of Ceylon. The earliest edition of the *Species Plantarum*, in which Ceylon is given (erroneously) as a locality for the Amomum Granum paradisi, is that of Reichard, published at Frankfort in 1779.

But though guiltless of the error just referred to, Linnæus has committed some others with respect to this plant. His statement, that Madagascar is one of the native places of the Amomum Granum paradisi, is an error; for the Madagascar Amomum is a species distinct from that of Guinea, which exclusively yields the hot fiery seeds now sold as grains of Paradise. Moreover, the reference to Rheede's figure of "*Elettari*," vol. ii. t. 6. of the *Hortus Malabaricus*, as the representation of the Grain of Paradise, is an error which Linnæus himself committed in the second edition of his *Species Plantarum*, published in 1762. I am ignorant of the circumstances which led him to make this mistake. It is remarkable, however, that in the same edition he also refers to the same plate of Rheede's work, as containing a representation of the small Cardamom plant (*Elettaria Cardamomum*, Maton.) The latter reference,

which is also made in the *Flora Zeylanica*, I believe to be correct.

Wildenow, in his edition of the *Species Plantarum*, the first volume of which appeared in 1797, adopts the errors of both Reichard and Linnæus.

Moon follows Linnæus in referring to Rheede's figure of *Elettari*, plate 6, for a representation of the Grain of Paradise. As the fruit represented by Rheede neither resembles the real or Guinea Grain of Paradise, nor the Ceylon Cardamom, which Moon regards as Grain of Paradise, I am at a loss to understand how he could have committed so gross and inexcusable an error, unless, indeed, he had not a copy of the *Hortus Malabaricus* to refer to, and, therefore, quoted it at second-hand from Linnæus and Willdenow. Linnæus probably, when he quoted Rheede's figure, had never seen the fruit of the Grain of Paradise; while Moon, though familiar with the fruit of the Ceylon Cardamom, may not have had access to the *Hortus Malabaricus* when he quoted it. So dissimilar is the fruit in question to the figure quoted, that in no other way am I able to account for the errors just referred to.

The Cardamom plant mentioned by Linnæus, in his *Flora Zeylanica*, as "Amomum scapo bracteis alternis laxis caule breviore," may have been either the Malabar Cardamom (*Elettaria Cardamomum*, Maton) or the Ceylon Cardamom (*Elettaria major*, Smith.) I am inclined to think, however, that it was the latter; for the plants were collected by Dr. Paul Hermann, who gives, in his *Musæum Zeylanicum*, *Ensal* as the Singhalese name of the Cardamom plant. Now, Moon states, that this is the native name for his Amomum Granum paradisi (*Elettaria major*, Smith.) It follows, therefore, that the synonymes "Cardamomum minus" and "Elettaria," given by Linnæus, are erroneous.

I now proceed to give a botanical description of the plant which yields the Ceylon Cardamom, premising, however,

that my specimen, from which this description is drawn, is in fruit, and does not possess any flowers. Notwithstanding this drawback to the establishment of its generic position, I have no doubt that it belongs to the genus *Elettaria.* Speaking of the fruits, Sir James Edward Smith* observes, "We are persuaded they must belong to the same genus as the Malabar Cardamom. They appear to have a similar panicled inflorescence, and the structure of the *fruit,* with its central *receptacle,* coriaceous striated valves, and angular rough or rugged *seeds,* are the same in this as in the last."—[*Elettaria Cardamomum.*] Messrs. T. F. L. Nees von Esenbeck and C. H. Ebermaier† also observe, that they are inclined to regard the mother-plant of the *Cardamomum longum officinarum* (which from their description is obviously our Ceylon Cardamom) to be either the Elettaria Cardamomum or a species closely allied to it. In confirmation of the opinion of these eminent botanists, I may refer to the rhizome, stem and leaves, which, as well as the fruit relied on by Sir J. E. Smith, have considerable resemblance to the Elettaria Cardamom. I feel myself justified, therefore, in regarding the Ceylon Cardamom as a species of Elettaria, and in adopting the specific name assigned to it by the last mentioned distinguished botanist.

Elettaria Major, *Smith, in Rees' Cyclopædia,* vol. xxxix; Alpinia Granum Paradisi, *Moon*; *Catalogue of the Indigenous and Exotic plants growing in Ceylon;* Zingiber Ensal *Gærtner De fructibus et seminibus plantarum,* t. 12, f. 5; Cardamomum majus vulgare *Clusius, Aromatum Histor.* lib. 1; Ensal, *Singhalese.* Figured in Pereira's *Materia Medica,* vol. ii., p. 1033. 2d edition. 1842.

Rhizome, with numerous branching root-fibres.

* Rees' Cyclopædia, vol. xxxix. Art. Elettaria.

† Handbuch der medicinisch-pharmaceutischen Botanik, 1er. Theil, p. 253. Dusseldorf, 1830.

Stem erect, smooth, enveloped by numerous leaf-sheaths.

Leaves sessile (or nearly so) on their sheaths, silky beneath, acuminate; the shorter ones lanceolate, the larger ones oblong-lanceolate or slightly obovate-lanceolate; breadth two to three inches, length not exceeding fifteen inches.

Leaf-sheaths about half the length of the leaves, with a roundish ligula.

Scape from the upper part of the rhizome, flexuose, jointed, nine inches long, branched; the branches alternate, one from each joint of the scape, suberect, half an inch long, supporting two or three pedicels of about three-tenths of an inch long.

Bracts solitary, sheathing, at each joint of the scape, withered, partial ones solitary, ovate, acute.

Flowers not present on my specimen. *Inflorescence* probably panicled. *Calyx* three-lobed.

Capsules lanceolate-oblong, acutely triangular, more or less curved, with flat and ribbed sides; length about 1½ inches, breadth ⅓ of an inch. At one extremity there is usually found the long cylindrical, permanent, three-lobed calyx. Each branch of the scape supports one or two capsules. Pericarp, in the dried state, coriaceous, tough, brownish, or yellowish ash colored, three-celled.

Seeds angular, rugged, with a yellowish or red hue; odor fragrant, aromatic, peculiar; flavor aromatic, spicy, but not acrid and fiery, like that of the Malaguetta pepper.

Perennial. Native of Ceylon; cultivated at Kandy. Grows in shady situations in a rich mixed soil.

The dried capsules are imported into this country from Ceylon, and are known in commerce as *Wild* or *Ceylon Cardamoms.* They are of inferior value to the *Malabar Cardamoms* (*Elettaria Cardamomum,* Maton). Thus in the *Trade List* of the 15th March, 1842, the price of

Ceylon Cardamoms is quoted at 1*s.* 0*d.* to 1*s.* 2*d.* per pound in bond, while that of the Malabar Cardamoms is quoted at from 1*s.* 8*d.* to 2*s.* 6*d.* per pound. Mastius* states, that 100 parts of the Ceylon Cardamoms consist of 71 parts of seeds, and 29 parts of pericarpial coats. By distillation the seeds yield an aromatic oil.

Bertolacci† observes, that "the cardamom of Ceylon, although held in estimation as an article of trade, is accounted greatly inferior to that which grows on the coast of Malabar, and is sold, I believe, at only one-third of the price the former. That which the island exports is collected chiefly in the Candian territory. I am informed that pepper, coffee, and cardamoms were not indigenous plants of Ceylon, but have been introduced by the Dutch." But it is probable that the latter part of this statement applies to the Malabar Cardamom only, which, according to Moon, is called by the Singhalese *Rata-ensal*, that is *Foreign Cardamom*—while the Ceylon Cardamom is simply called *Ensal*, that is, Cardamom.

The quantity of Cardamoms exported from Ceylon from the year 1806 to 1813 inclusive, is, according to Bertolacci as follows.

		Candies.
In 1806	- - -	$4\frac{1}{2}$
1807	- - -	15
1808	- - -	7
1809	- -	$4\frac{1}{2}$
1810	- - -	18
1811	- - -	$9\frac{1}{4}$
1812	- - -	$7\frac{5}{8}$
1813	- - -	$10\frac{4}{5}$

AVERAGE OF EIGHT YEARS ABOUT $9\frac{1}{2}$ PER ANNUM.

* Grundriss der Pharmakognosie des Pflanzenreiches, p. 254. Erlangen, 1832.

† View of the Agricultural, Commercial, and Financial Interests of Ceylon, p. 157. London, 1817.

As the Malabar Cardamom is, according to Moon, also cultivated at Kandy, it is probable that it constitutes a part of the above exports. I have not been able to ascertain the quantities exported subsequently to the year 1813.

Percival* observes, that "Cardamoms grow in the South-east part of the island [Ceylon,] particularly in the neighborhood of Matura. The seeds in taste resemble our caraways, and are used for seasoning various dishes." Moon also states that the seeds are esculent.

Pharm. Journ. and Trans.

ART. VI.—SCAMMONY AND JALAP: IDENTITY OF THEIR ACTIVE PRINCIPLES. By Henry Osborn.

It does not appear to have been noticed by any Pharmaceutical author, that scammony and jalap, which are two of the most important vegetable purgatives we possess, are identical, as regards their medicinal properties; but I am induced to conclude that such is the case, from the result of the following experiments, and will leave others to judge as to whether I am correct; for I believe it is quite time that some plan should be adopted for obtaining scammony at much less expense, as an inferior article is so often sold and purchased by those who are fond of gaining custom, by reducing their prices, which does not contain one-half as much of the medicinal property as that imported from Aleppo.

To prove this, however, it is only necessary to digest one drachm of scammony powder in rectified spirit until all the

* Account of Ceylon; to which is added the Journal of an Embassy to the Court of Kandy. 4to. Lond. 1803.

resin is taken up, which is known by its turning milky with water so long as the resin is held in solution: mix the tincture with water, and, when the resin has entirely precipitated, pour off the clear liquid and dry the resin until it is capable of being reduced to powder; in this state it should weigh from forty-three to forty-five grains; but the inferior scammony will yield only from sixteen to twenty grains from the same quantity.

The purity of jalap may also be proved by the same process: two drachms of the powdered root, having a resinous fracture, and of a brownish gray interior, gave ten grains of resin, and the light and white root nine grains.

To prove whether the scammony contained any more of the medicinal property after the resin was extracted, I took twelve grains of the residue, and no effect took place. A few days after, I took twenty grains of the extract of jalap deprived of the resin, and no action was produced. I afterwards took three grains of the pure resins of jalap and scammony in the form of a pill at different periods, and found them act as brisk purgatives, and without perceiving any difference in their strength. It may be necessary to state, that every dose was taken when the system did not require medicine, as a material difference in their effect would be the consequence if this caution were not observed, because the resins are rendered more nauseating and irritating by the presence of acid in the stomach: it is from this cause that children so often reject these purgatives. Alkalis, on the contrary, have the power of modifying the activity of resins by entirely suspending their griping effects—a fact which I proved by boiling them in a solution of soda until dissolved, and by taking a dose of each; I found nine grains of each resin, when held in solution, equal in effect to only three grains of the solid resins; their action was particularly mild, and they might be introduced into practice as a most agreeable purgative, since their taste was scarcely perceptible when taken in any of the mineral waters; imme-

diately after they were swallowed, however, an irritation was excited in the throat, which formed an objection to their use. Moreover, the resin thus held in solution is liable to be precipitated in the stomach when it comes in contact with an acid, which would increase the effect twofold.

The irritation produced in the throat is caused by a volatile oil, and the griping, by an acid; both of which may be separated by distillation. Two drachms of the resins were put into separate glass retorts, and kept in a sand bath until all the acids and oils distilled over. The first portion, however, that came over, was only a little aromatic water, which was taken from the receiver without being allowed to dilute the acids. The oils thus produced were of a dark brown color, becoming white by redistillation, but soon returning to their former color. The acids, from the tests which I used, I believe to be nothing more than strong acetic acid impregnated with the odor of the oils. The acids and oils of both resins exist in the same relative proportions, but not in equal quantities: about one of the former to two of the latter is as near as I can recollect, having lost the memorandum since I performed the experiment—now two years since.

The fact of the alkalis diminishing the action of the resins, led me to suppose that the oils could not be very active, as the acids were separated from them, and as they could not be united and taken in the form of draught, owing to their being so exceedingly nauseous; I therefore took one drop in the form of pill; but even in that state, and being covered with silver leaf, it irritated the fauces so much, as to cause it to be rejected several times; but after it passed the throat, I only found a hot and nauseous taste, and after a short time a degree of warmth in the abdomen, with a sensation similar to that produced by a mild dose of medicine, without being sufficiently potent to carry itself off. In this experiment I was also unable to detect any difference in the strength of the two oils; and I am of opinion, if the quantity had been a

little greater, the effect would have been the same as the alkaline solutions; but should it be doubted that the oils constitute the active principle of the resins, it may be proved by introducing a few drops in a capsule, in which manner it may be swallowed without inconvenience.

To procure scammony at a cheaper rate is the object of my publishing the foregoing; and I think nothing more would be necessary than to express the milky juice from the fresh roots of jalap, and allow it to evaporate spontaneously, which, I should imagine, would procure a larger quantity and equally pure as the scammony obtained by making an incision in the root, and allowing the juice to exude; however, this cannot be tried in this country, but I think it would be worth the attention of some individual who may have it in his power to try what I have now suggested.

The Chemist.

ART. VII.—ON GALBANUM.

By M. Ludwig.

There is some difference of opinion concerning the plants which produce galbanum, arising from the supposition that it comes from only one plant, notwithstanding that commerce furnishes two entirely different sorts.

The most common opinion relative to the origin of galbanum attributes it to the *Bubor Gummiferum*, L., *Ferula Galbanifera*, Com. Hort., indigenous to the south of Africa, and to the *Bubor Galbanum*, L., *Ferula Galbanifera*, Herm., a rather different species, frequently found in the botanical gardens of Europe.

Mr. Ludwig does not think that these are the maternal

plants of galbanum, because they do not possess the slightest odor of that gum resin.

With greater probability, this drug is attributed to the *Ferula Galbanifera*, Lobel. M. Ludwig does not think that all the galbanum is procured from this plant, but that a quantity is also yielded by the *Galbanum Officinale*, which is found in great abundance in the Levant and Syria; this origin is not yet proved, and requires to be confirmed by local observations.

Three kinds of galbanum are distinguished in commerce:—

1. Galbanum in Grains (*Galbanum in granis.*)—In separate grains, but attached to one another, from the size of a small pea to that of a nut, of a yellowish, whitish, or greenish color. The odor is strong, penetrating, and peculiar, but not disagreeable; the taste is sharp, resinous, and rather bitter; sp. gr. 1.212; it softens between the fingers.

2. Galbanum in Masses (*Galbanum in massis.*)—Large pieces of a variable color, yellow, greenish, &c., mixed with hairs and other foreign matters, or stalks and petioles.

The odor resembles that of the preceding sort, but is sometimes more penetrating; it is also of a softer consistence.

These two kinds are called by M. Ludwig, Levantic galbanum, and they are essentially distinct from the following:

3. Persian Galbanum.—Commerce furnishes it in large masses, packed in the skins of animals. This gum has a reddish brown color, with white lines; it is so soft that it becomes liquid at a low temperature. It is very impure. Its odor is quite different from that of the preceding: it is more penetrating and disagreeable, resembling that of assafœtida. The taste is disagreeable, bitter, and resinous.

From the following considerations, M. Ludwig infers

that the last kind has a different origin from the two first:—

1. The color is never greenish, but always reddish brown.

2. The odor is quite characteristic.

3. In commerce it is always more impure, and is never met with in grains, or in the state of Levantic galbanum. The *débris* of the stalks are different and thicker.

4. It is procured from another country. Persian galbanum is always received from Astracan and Oremburg, and it is the kind employed in Russia.

Levantic galbanum is imported into Trieste and Marseilles, and it has but recently been known and used in Russia.

A large quantity of Levantic galbanum, which was deposited for a long time in Hanover, where it was entirely unknown, was recognised by M. Ludwig, and it was very soon sold with advantage, having been found as good as that received from Marseilles.

Ibid.

ART. VIII.—PREPARATION OF OXIDE OF PLATINUM.

By M. Wittstein.

The author commenced by preparing sulphate of platina by dissolving platinum in nitro-muriatic acid, and by afterwards heating the mass with sulphuric acid; for 24 parts of platinum, 23 parts of sulphuric acid were taken.

The liquid was evaporated in a sand-bath, and continually stirred; a pulverulent, blackish residue was then obtained, which was entirely soluble in water. The sulphuric acid was removed by means of nitrate of baryta, and precipitation was effected by carbonate of lime, and boiling the liquor: a brown precipitate was obtained, which was washed with acetic acid, to remove the excess of carbonate of lime.

Oxide of platinum, thus prepared, is of a dull brown; it detonates when heated.

By analysing this compound, the author ascertained that it should be regarded as a bihydrate, which he represents by the following formula:—

$$Pt\,O^2 + H^4\,O^2.$$

Ibid, from Buchner's Repertorium.

ART. IX.—NEW PROCESS FOR OBTAINING THE RESIN OF JALAP IN A STATE OF PURITY AND PERFECTLY WHITE. By M. A Nativelle.

In a thesis presented to the *Ecole de Pharmacie*, in the month of July last, I pointed out a process for extracting this resin, deprived of all coloring matter; but as this process has since undergone several modifications, I have thought that it was necessary again to describe it, and that in a more detailed manner than I then did. M. Planche has already paid much attention to the preparation of this resin, which he obtained, of a very light color, by removing, as is here done by aqueous but cold solutions, the extractive matter of the roots. The process which I am about to describe therefore coincides with the ideas of that distinguished pharmaceutist.

PREPARATION.

Each root of jalap is cut into two or three pieces, and boiling water is poured on, in order to swell the roots, which would otherwise be too hard to be at first easily divided. Next day, when they have taken up nearly the volume which they might have contained in the recent state, they are cut into as thin slices as possible; water is again added. and they are boiled in a copper basin for about ten minutes, being occasionally stirred: this being done, the whole, liquid and roots, is poured into the box of a press; the deep colored liquor flows out, and the residue is submitted to a kind of pressure. Two similar decoctions are then made, being pressed each time; this precaution is indispensable for removing all the extractive coloring matter contained in the spongy tissues of the roots.

The liquors of these decoctions are rejected as useless; but they might be used for preparing an aqueous extract of jalap.

After these three treatments, the water runs out quite colorless, and there remains only pure resin fixed in the ligneous matter. It is then heated by alcohol; for that purpose, the exhausted roots, as they come out of the press, are placed in the sand-bath of an alembic; a sufficient quantity of alcohol at 65° C. is then added. Alcohol at 85° C. which was first directed, has the inconvenience of hardening the roots by removing the small quantity of water which they retain, and consequently impedes the solution of the resin fixed in the interior of the ligneous slices. The sand-bath is then covered with its head; it is boiled for ten minutes; and when the whole is nearly cold, it is pressed in the same manner as directed for the aqueous decoctions. Two similar treatments are also made, after which the roots are entirely exhausted. All the alcoholic decoctions are then mixed; the liquor which results has a very slight amber tint, which soon disappears on a small quantity of finely divided animal charcoal being stirred with it; it is filtered, and then distilled in the sand-bath until nothing passes over. The resin remains fluid at the bottom of the sand-bath, under the water and alcohol: it requires only to be dried; if, instead of operating in a tin sand-bath, an untinned copper one be used, the resin has a blackish appearance, owing to an insoluble matter mechanically contained in it. This matter, which appears to be a combination of the resin with the copper of the sand-bath, exists only in very small quantity; however, small as that quantity is, it is necessary to remove it for the resin to appear white; and as it is only interposed, it is sufficient, to separate it from the mass, to dissolve the resin in twice or three times its bulk of alcohol of 65° C., to add a very small quantity of animal charcoal and to filter. The alcohol passes off quite colorless; it is evaporated in a capsule placed on boiling water; as the al-

cohol evaporates, the resin is precipitated under the form of a thick and colorless turpentine. The supernatant water is separated, the resin is spread out on the sides of the capsule, and the heat is continued until it is perfectly dry, when it is so friable that it may easily be reduced to a fine powder. This powder is as white as starch; every kilogramme of jalap, of good quality, gives a hundred grammes of pure resin; a result which agrees very well with the quantitative analysis. This resin has been tried; it is as active as that obtained by the other processes, by which it is not produced in the white state. Three decigrammes, suspended in half a glassful of milk of almonds, acted as a powerful purgative. in the dose of even two decigrammes, its action was almost as energetic. Reduced to powder, and put in contact with cold water, it presents the peculiar characteristic of forming a semi-fluid, transparant mass, as if it had been melted; it has the same appearance as resin which has just been precipitated by water from its alcoholic solution. Under this form, it would seem to re-constitute a hydrate, by again taking up the water which it had lost by desiccation; however, this character may be used to a certain point for distinguishing the resin of jalap from other resins, which remain pulverulent during their contact with water. If a certain quantity of colophane be mixed with resin of jalap in powder, and treated by water, the whole mass combines, but with an opaque appearance, occasioned by the colophane, which, as it cannot be incoporated with water, remains interposed in the middle of the mass. However, this character would not be sufficiently accurate for determining a small quantity of foreign resin put in for the sake of sophisticating the pure resin. By an analogous means, the other resins, which, like that of jalap, are entirely insoluble in water, might be extracted.

Ibid, from Journ. de Pharm. et de Chim.

ART. X .—INVESTIGATIONS CONCERNING A RESIN EXTRACTED FROM BALSAM OF COPAIBA. By M. FEHLING.

The author examined a slightly crystalline deposit formed in balsam of copaiba of good quality. He determined the composition of this resin in the hydrated and anhydrous states. Its atomic weight was deduced from the combustion of the salts of lead and silver. By analysis, it gave the following results.

HYDRATED RESIN.

		Atoms.
C.	= 72.345	C^{40}.
H.	= 9.022	H^{60}.
O.	= 18.633	O^{8}.
	100.000.	

ANHYDROUS RESIN.

C.	= 76.274	C^{40}.
H.	= 8.805	H^{56}
O.	= 14.921	O^{6}.
	100.000.	

The resin is isomeric with the oxysylvic acid of Hess, which contains—

C.	= 72.14
H.	= 8.74
O.	= 19.12
	100.00

This resin, treated by nitric acid, gave rise to two pro-

ducts; one soluble in water, and containing no nitrogen; the other insoluble and nitrogenous.

Finally, the resin evaporated to dryness with nitric acid produced a black mass, which, treated by alcohol, left a residue insoluble in water and soluble in alcohol, which the author compared with ulmic acid. This matter contained 65.47 of carbon and 5.43 of hydrogen. *Ibid.*

ART. XI.—THE VEGETABLE IVORY, OR TAQUA PLANT.

(*Phytelephas macrocarpa.* Willdenow.)

By Mr. Smith.

This tree, which resembles a palm, grows in the hot low valleys of the Peruvian Andes. The fruit at first contains an insipid and limpid fluid, with which travellers quench their thirst; afterwards the liquid becomes milky and sweet, but increases in consistence till it becomes solid as ivory. The taste varies; if the fruit be cut off while soft, and filled with fluid, the liquid becomes sour if kept long. Of the nuts the inhabitants form handles for knives, spindles, and other ornaments, which are whiter than real ivory, the color and hardness of which they retain, provided they be not kept too long under water; but even then, when dried, they again become white and hard.

The Indians cover their cottages with the largest leaves, and the English manufacture all kinds of fancy articles with the nut, which in color supersedes the elephant ivory.

Pharm. Journ. and Trans.

ART. XII.—INDIA-RUBBER COURT-PLASTER.

By Mr. B. C. Rowland.

The Pharmaceutical Journal, No. IV., 1st Vol. contains an article detailing the manner of making Mr. Liston's isinglass plaster, spread either upon silk or membrane. I am induced to lay before your readers, in furtherance of the same subject, the best method of making India-rubber Court-plaster, *which does not wash off;* thinking, as it has become an article now in general use, that the mode of its preparation may interest the Chemist and Druggist.

A stout frame of wood must be made about three yards long, (or any length that would be most convenient,) and about one yard and a quarter wide. Within this frame must be placed two sides of another frame running longitudinally and across, so fixed in the outer frame that the two pieces may slide, independently of each other, backward and forward about six inches.

Tapes of canvass must be tacked round the inside of the inner frame and the corresponding sides of the outer frame, so as to form a square for the material to be sewed in; which when done, the two loose frames must be drawn tightly to the outer, by means of a twine passed round each, in order to stretch, perfectly free from irregularities, the silk or satin previous to laying on the composition.

To make the India-rubber plaster:—Dissolve India-rubber in naphtha, or naphtha and turpentine, and lay it on with a brush, on the opposite side to that intended for the plaster, and when perfectly dry, and the smell in a great measure dissipated, it will be ready for the adhesive material; to make which—take equal parts of Salisbury glue, or fine Russian glue, and the best isinglass, dissolved in a suffi-

cient quantity of water over a water bath, and laid on with "a flat hog-tool" while warm. It is requisite to use great caution in spreading the plaster evenly, and in one direction; and a sufficient number of coatings must be given to form a smooth surface, through which the texture of the fabric is not perceptible. Each coating should be perfectly dry before the succeeding one is given, and placed in a situation free from dust, and where a draught of air would facilitate the drying. The quantity of water used, and the weight of the two materials, must be a little varied according to the season, and the gelatine strength they possess.

Lastly, the plaster being ready to receive the polishing coat, which gives also the balsamic effect to it—a preparation is made in nearly the same manner as the tinctura benzoini composita of the Pharmacopœia, with the addition of more gums; this preparation must be laid on once only, and with a brush kept for the purpose. For making plasters on colored silk, it is only necessary to select the silk a shade deeper than the color required, as the plaster causes it to appear a little lighter.

The process being finished, the plaster must be cut out of the frame with scissors, as near to the canvass to which it is sewed as it will admit. For sale, it is cut up in squares, which is best done by means of a compass and rule.

I have tried various solvents for India-rubber, and find none answer so well as those above mentioned. Ether dissolves it with facility, and possesses the advantage of cleanliness, but it is much more expensive, and evaporates so rapidly, that it is almost impossible to spread the solution smoothly on the silk; naphtha evaporates more slowly, and is, therefore, preferable, but the quality requires attention, as it may be obtained almost free from that kreasote smell which is the only objection to its use. The addition of a small quantity of spirits of turpentine facilitates the solution of some specimens of India-rubber. The white In-

dia-rubber is better than that which has assumed a black color by exposure to the air.

I have tried various adhesive materials, but find the one I have mentioned to be the best. The grand arcanum in making court-plaster is *glue* and *isinglass*. The polishing coat is not absolutely necessary, but it improves the appearance of the plaster, and the gums may probably increase its healing property, and by giving it a more even surface cause it to adhere more closely. It has occurred to me, that a similar plaster might be made for common use with calico instead of silk, which might, in some cases, supersede the use of strapping; and also that the adhesive material might be made the vehicle for cantharidine or other stimulants. The isinglass plaster is apt to crack in warm dry weather, but this does not occur if it is kept in a cellar in an earthenware jar. *Ibid.*

ART. XIII.—HISTORY OF PHARMACY—A FRAGMENT.

By Mr. Cap.

(*Translated by Augustine Duhamel.*)

I. SCHOOL OF ALEXANDRIA.*

Distribution of Medicine into three professions.

The flourishing state to which the sciences were elevated in Greece, by the labors of the Peripatetic school, and the protection of Alexander, could not continue a long time. After the death of the King of Macedonia his empire was dismembered. In the division, Egypt fell to the lot of Ptolemy Soter, son of Lagus and brother-in-law of Alexander, who had contributed to his conquests and partook of his taste for philosophy and the sciences. Ptolemy founded at Alexandria the *Museum*, a vast depot, where he reunited the natural productions of all the then known countries, and collected a considerable number of manuscripts with which he formed an immense library.

Ptolemy Philadelphus, who succeeded to Soter, further enriched these precious collections. The library established in the temple of Serapis became enriched with all the works which he caused to be bought at Athens, Rhodes, and throughout Greece.

He likewise gathered together a large number of strange living animals, with which he formed a menagerie.

The kings of Syria and Pergamus rivalled with the Ptolemies in the encouragement which they gave to *savants* and philosophers. This rivalry was carried so far that Ptolemy prohibited the exportation of papyrus, in order to take

* This article forms the second chapter of Book Second of a *History of Pharmacy*, at which the author has been working for several years.

from their competitors the means of carrying off their literary treasures.

It was then, and during the reign of Eumenes, King of Pergamus, that parchment was invented.*

Alexandria soon became the centre of civilization, the sanctuary of knowledge, and the rendezvous of philosophers and *savants*, who flocked thither from all quarters, attracted together by the resources presented for instruction, and the liberality of sovereigns, as well as by the beauty and salubrity of the climate.

Distant expeditions having multipled the relations with the East, and the commerce of the Egyptians being considerably extended, Alexandria became at the same time the great commercial mart of the civilized world, and the natural route by which the productions of India, such as drugs, spices, and medicines, arrived in Europe, furnishing immense materials for the study of naturalists. This glorious and prosperous condition existed for nearly two centuries, under the dynasty of the Lagides.

The majority of the princes of this family made themselves remarkable by their taste for erudition and their scientific researches. Evergetes second, and seventh of Ptolemies, (or rather the eighth agreeably to modern discovery,) a disciple of Aristarchus, cultivated the natural sciences with success, and wrote a treatise upon animals. It was under his reign, however, that the prosperity of the Alexandrian school was arrested. Having excited his subjects to rebel against him, this cruel prince was obliged to retire to the Isle of Cyprus; repossessed of his estates, he perpetrated such acts of vengeance that Alexandria soon became a desert. The persecution operated chiefly upon philosophers, *savants* and physicians, who abandoned Egypt and retired to Athens, where they revived for a time

* It is evidently from the word *Pergamus*, that *parchment* borrows its name.

the culture of letters and sciences. Others retired to Laodicea where they established a medical school in the temple of Carus. Although such concurrent circumstances singularly favored the perfection of sciences in the school of Alexandria, yet all the results that might be anticipated were not realized.

Natural history could not acquire much from this prodigious quantity of books, collected with more haste than choice, and which frequently diverted the erudite from applying themselves to experimental researches. The study of nature even took a false direction. The peculiar taste of the Egyptians for the marvellous led them to study merely those substances presenting something extraordinary or singular: from thence come the numerous works *de mirabilibus*, dating from this epoch, and in which they too often digress from the truth.

The Ptolemies had also ėstablished an Academy where learned men were lodged and entertained, likewise literary solemnities called *Musarum et Apollinis ludi.*

These conventions, where the genius of speech shone more prominently, gave rise to fewer *savants* than orators and sophists; furthermore, encouraged by the value attached to books, scholiasts and commentators abounded; it is likewise to this epoch must be ascribed most of the alterations, interpolations in the text of manuscripts, and those numerous apocryphal works amongst which it is difficult to recognise authentic or original writings.

Neither did the medical sciences make great progress in the school of Alexandria. Yet this school was then the only one where knowledge to a certain extent could be acquired; such physicians having belonged to it as Erasistratus and Herophilus, whose names, as well as a number of their scholars, are interwoven with the history of Materia Medica and Pharmacy.

Erasistratus, according to Pliny, was the grandson of Aristotle, by his mother's side. He had attended the lec-

tures of Theophrastus. He lived at the court of Seleucus Nicanor, King of Syria; it is well known that he discovered and succeeded in curing the disease of Antiochus, son of this prince, who was smitten with a violent passion for Stratonice.

Erasistratus was the author of a work on poisons. Although he was the first, according to Galen, to employ castoreum and several other active medicines, yet he labored to simplify the use of remedies, and censured those physicians who made a lamentable abuse of their complication. He particularly opposed *antidotes** and compositions called *Royal*, which the doctors of his time styled *hands of gods*, (*manus deorum*.) He rarely used other than external remedies, and had a decided predilection for chicory, pumpkin, barley tea, cups, and especially *hydrœlum*, a mixture of water and oil, which he employed for injections and fomentations in inflammatory diseases.

Herophilus of Chalcedon, in the employment of medicines, professed a doctrine entirely opposite to that of Erasistratus. He used a great deal of hellebore, and attributed powerful effects to vegetable substances. He wrote upon Botany, and gave by his example a great impulse to the study of Materia Medica. It was especially in reference to him that Erasistratus condemned the abuse of medicines, because Herophilus had been the first to say that when properly employed they might be looked upon as the *hands of gods*. The majority of Herophilus' students were occupied with the Materia Medica; among them may be cited :

Endemus, who compounded a theriac, the formula of which was preserved by Galen. The composition of this, described in verse, was engraved upon the gates of the Temple of Esculapius. Antiochus Philometor employed it daily.

Mantias, is another pupil of Herophilus, who wrote a trea-

* From αντι, against, and δοτος, given; given against.

tise upon the preparation of medicines. This work, quoted by Galen, has not yet reached us.

Apollonius, of Memphis, who left a work upon Botany, and several formulas for medicinal compounds, of which he was the inventor.

Zeno, of Laodicea, who devised a large numbor of pharmaceutic compositions. One against colic, bearing the name of *diastæchados** was much lauded. Galen cites several other antidotes of his invention.

Apollonius, of Mysia or Citium, another Herophilite, who wrote an essay upon ointments (πιρι μυραν;) a second upon the *euporistes* (medicines easy to procure,) and a third upon antidotes.

Andreas, of Caristum, the author of a work upon the properties of medicines entitled *Nartex*,† and another upon poisons. He invented several collyriums, contested the fabulous opinion of the coupling of the asp with the *nuræma*, and pointed out several changes which commercial opium underwent at Alexandria.

None of the works upon medicine of this school lived beyond the age. The fury of Omarius alone did not destroy the vestiges; in the time of Julius Cæsar, the library belonging to the palace of the Ptolemies, was consumed by fire; it enclosed, as it is said, 400,000 volumes. But that of the temple of Serapis continued to exist, and Marc Antony enriched it by giving to Cleopatra those of the Kings of Pergamus, which, according to Plutarch, increased it to more than 200,000 volumes.

It was in the Alexandrian school that was wrought, for the first time, the distribution of the professions appertaining to medical art; this division was induced, as Sprengel‡

* Of which the *stæchas* (Lavandula stæchas, L.) was the base.

† The Greek word ναρθεξ signifies switch, stick, thyrsus, *ferule*, and also box. It was as the arsenal of medicines. This name has been since given to several other collections of formulas.

‡ Histor. rei herb. Vol. i. p. 121.

thinks, either by the idleness or opulence of the physicians, who abandoned to subordinates a part of their duties, or else the continual branching off from the expanse of the knowledge relating to medicine, shewed the necessity of separating them in order to render the study easier, and its application more profitable. Celsius has saved to us some curious documents,* from which we shall extract that which particularly concerns the attributes of pharmaceutists.

The practice of medicine was divided into three branches. The first treated chiefly of diseases by diet; this was *Dietetics:* the second by the use of medicines, which they called *Pharmacy:* and the third consisted of operations by hand, which was *Surgery.*

It may be conceived, nevertheless, that these three branches were not separated in such a way that the one should never encroach upon the dominion of the other. It is evident that dietetics would frequently call to its aid the two other professions. Surgery, however, took up solely with that which required a manual operation. It could not even treat sores, ulcers, and tumors, which called for the application of medicines.

It was reserved for the *Pharmaciens* to treat these kinds of affections, except where they were obliged to have recourse to the knife or fire, in which case only was the surgeon called. Previous to the division of the medical professions the duties of the whole were fulfilled in the one. There were, however, two classes of physicians; the most learned, and consequently the most esteemed, went by the name of *architectes*, Αρχιτεκτονικοι, and gave the orders and advice which the others executed.

These latter were the *manœuvres*, δημιουργοι, and were those who practised both surgery and pharmacy. The word *vulnerarius* applies as well to one as the other.

Those who exercised *pharmacy*, or the *medicine of*

* De Re Medica.

medicines, were called *pharmaceutæ.* The word *pharmacopœus* is taken in wrong sense, and signifies a poisoner, for the word φαρμακον is applied to all sorts of useful or baneful drugs. The Latins understood alike by the term *medicamentum*, a medicine or a poison. The word *pharmacopola* designated another profession : those were so styled who sold medicines, though they did not prepare them. They had likewise applied to them the terms *circulatores, circuitores, circumforanei*, in Greek περιοδευτοι, which corresponded to the word charlatan, and *agyrtæ*, αγυρται*, because the people collected around them. Those who kept an open shop were styled *sellularii*, επιδιφριοι ιατροι, or sedentary doctors. It is the profession which Aristotle exercised, also Eudemus and Chariton, mentioned by Galen, and very likely Galen himself: finally, this is the pharmacy we now find practised in England.

The *pharmaceutribæ*, those who mixed, pounded, or ground drugs, were probably identical with the *pharmaceutæ.* They compounded remedies, but did not apply them. The druggists went by the name of *seplasiarii, pigmentarii*, in Greek παντοπῶλαι, κατολικοι and μιγματοπῶλαι. They sold drugs for medicinal use, as also for use of painters, perfumers and dyers. The shop or store where the drugs were contained was called *seplasium*, and the profession *seplasia.* Pliny already spoke of alterations and sophistications which medicinal substances underwent in the hands of the druggists, and the carelessness of physicians who neglected to examine or prepare the medicines themselves.

Several centuries after Celsius, the *pigmentarii* from being druggists at first, became regular apothecaries, or at least arrogated to themselves their privileges. The ordinary plants were sold by the herborists, *herbarii*, in Greek ριζοτομοι, *root cutters*, or βοτανικοι, *who gather herbs.* The

* From αγυρο to assemble.

rhizotomes who collected roots affected to gather them with superstitious ceremonies, and made no scruple about substitutions. The *rhizotomes* and those exercising pharmacy, had stoves appropriated to their use. They were called *apothecæ*, (αποθηκαι,) a general name for stores or depots of merchandize, from whence the Italian *Botega*, the French word *Boutique*, as well as that of *Apothecary*. The surgeons had likewise shops bearing the name of *medicinæ*, a generic term applying to all those places where a profession was exercised depending upon medicine. They also assigned to the shops of the dyers the name of *pharmacon*. Those of the *pharmacopolæ* styled themselves *pharmacopolia*.

Those of the perfumers or venders of ointments, which were termed *myrepsi* from the Greek word μυρον, took the title of *myropolia* and *myrothecia*. Lastly, they gave to the barber's shops the name of κουρεια, and in Latin that of *tonstrinæ*.

This distinction between the medical professions was never very decided nor persistent. It appeared to have but a momentary existence, for it was quite obliterated among the Romans, and its traces only discovered about the era of the revival of sciences and letters.

Shortly after Celsius, physicians resumed the ancient custom, and practised themselves, or by deputies through their orders, exercising all the branches of the medicinal art. They continued alone to write upon every branch of medicine, pharmacy in particular. Works upon this subject were still very rare, the collections of receipts very select, and they imparted to libraries considerable value. Materia Medica, however, was enriched by a large number of active substances, perfumes, spices and aromatic drugs, obtained from divers countries, the depths of the Indies and Ethiopia.

About this epoch a knowledge of the sugar-cane com-

menced, the fabrication of which remained crude for a long time, but gradually superseded honey as a condiment.

Herophilus gave a great impulse to the employment of medicines; his scholars, according to custom, exaggerated the doctrine of the master. But out of the same school there soon arose a new sect, that of Empirics, which was to give to the Materia Medica a new activity, and a better guide to the study of medicines. Happy, indeed, if this reform had not been the source of deplorable abuses.

II. THE EMPIRICAL SCHOOL.

Serapio, Mithridates and Nicander,—The Kings of Pharmaceutists.

The origin of the Empirical school may be attributed to many circumstances concurring at once; but, in the ignorance of any other fact, to a kind of revolution in the medical sciences. Thus it was that the steps towards perfection in anatomy, and the objections that it raised, as opposed to the principles of the dogmatic school—the influence of Pyrrho's system of philosophy, then much in vogue; and lastly, the introduction into therapeutics of numerous new medicines imported through commerce, cast at once confusion among the established doctrines, and began to divert physicians from the path which Hippocrates had traced by observation.

Philinus, of Cos, pupil of Herophilus, was the first to build up a system of uncertainty in medical theories, and to propose an exclusive reliance upon experience in the treatment of diseases. Serapio, of Alexandria, his successor, gave still further extension to this system, and laid down the principle not to admit but that which is evident, to reject all hypotheses, and even every investigation into the hidden cause of diseases. It is evident that the study of medicines was to be the base of this new method; accord-

ingly the Empirics betook themselves to experimenting *à priori* upon all the substances with which the Materia Medica was recently enriched. Unfortunately, they did not always employ a good method of observation; instead of studying the isolated action of each substance, they associated them in complicated formulas. Since such a medicine had succeeded in a simple case, they thought that two substances combined ought to act simultaneously, in an affection occupying a double stage; and as in certain diseases numerous symptoms are observed, they imagined that a preparation containing all the drugs capable of acting individually upon them would be perfectly efficacious, trusting as Dr Le Clerc wittily remarked, that the physic would be more serviceable than the physician. Hence the origin of the digression into which the empirical class were led away, and of that polypharmacy, the abuse of which, to begin with this epoch, grew up and extended itself from century to century.

Serapio employed himself actively in the study of medicines; he collected together all the formulas, the virtues of which were sanctioned by popular usage.

Ætius, of Amidus, and Nicholas Myrepsus, have handed down to us a number of preparations, of which Serapio was the inventor. We know, likewise, that he made use in cholera of pills composed of hyosciamus seed, aniseed an opium, a formula very analogous to the means latterly employed against this terrible scourge. In the iliac passion he made use of a composition into which *gnidium* berries, (the daphne mezereum) entered; also, salt, elaterium, resin, castoreum, and diagrede.* This is the first example of the employment of the last named substance.

For tetter, and some diseases of the skin, he made use of a mixture of nitre, sulphur and resin. Finally, it appears

* Preparation of Scammony, the name of which comes from *dacrydion*, tear, because this resin being melted takes the form of a tear.

that already at this epoch they believed in the efficacy of certain foreign superstitious remedies in epilepsy, as Serapio recommended in this case, in addition to castoreum, the employment of which still continues, the brain and gall of the camel, the rennet of the seal, the excrements of the crocodile, the heart and kidneys of the hare, turtle's blood, and ram's testicles, or those of the bear, cock, or wildboar. It is to Cœlius Aurelianus we owe these details.

Apollonius, of Antioch, wrote a treatise upon the preparation of ointments, and another upon the composition of extemporaneous medicines.

Heraclides, of Sarentum, a student of Mantias, greatly improved the Materia Medica, and was the author of a complete work upon medicines. This book is lost at the present day. He likewise interested himself with antidotes. Cicuta, opium, and hyosciamus were the bases of these antidotes, the experiments of which he always made upon himself.

Opium was one of his favorite remedies,* also some of the then newly imported Eastern aromatics, such as the costus, long pepper, canella, opobalsamum, and assafœtida.

Cleophanthus, who was the preceptor of Asclepiades, left behind him a learned description of medicinal plants. Lopyrus, who resided at the court of the Ptolemies, prepared an antidote to which he gave the name of *Ambrosia*. Galen says that he suggested to Mithridates to make a trial of it upon a criminal who should be previously poisoned, assuring him that his antidote would destroy the effect of

* The origin of opium is unknown. If it is true that under the name of *nèpenthès* it was intended to designate the juice of poppy, the discovery of its calming property would be carried back to a great antiquity. Hippocrates speaks of the poppy juice, and the poppy itself, as being somniferous. Diagoras, who was the slave of Democrites, and consequently contemporary with Hippocrates, cited *opium* as a dangerous thing in inflammations of the eyes and ears. The empirics repudiated this statement and encouraged its use.

the poison. He was the first to have the idea of a classification of medicines arranged in the order of their properties.

Cratevas, a celebrated botanist, wrote a work upon plants, having for its title, *Rhizotomoumena*. He added to his description of vegetables, drawings representing them. The manuscript of this work still exists in the library of St. Marc, at Venice. An interesting circumstance to prove for the history of Pharmacy, is that during two or three centuries, whilst sciences flourished in Egypt and Asia Minor, almost all the sovereigns gave their attention to medical studies, especially pharmaceutic researches, and that their discoveries throw some light upon the doctrine of poisons and counterpoisons.

We have spoken of the encouragement afforded to natural sciences by the Ptolemies, and the individual labors of several princes of this family. Antiochus Philometor,—Nicomedes, King of Bithnyia,—the Queens Cleopatra and Artemisia,* the Kings Attalus and Mithridates, not only cultivated the medical sciences, but invented and compounded medicines themselves, to which they did not disdain to give their names.

To Agrippa, King of Judea, is attributed the invention of the ointment bearing his name.†

* It is pretended that Artemisia, Queen of Caria, and wife of Mausolus, gave her name to the mugwort, (Artemisia Vulgaris, L.) It is at least equally probable that the name of the genus comes from the Greek Αρτεμις which was one of the surnames of Diana, patron of virgins, by reason of the known efficacy of this plant in certain affections of the uterus.

† The name of this preparation could as likely be attributed to the word αγριππον, which among the Greeks meant *juice of the plant.* Suidas asserts that at Sparata the same word served to designate the wild olive. Olive oil, as well as the juice of a number of plants, entered, in fact, into the composition of the ointment of *Agrippa.*

Attalus Philometor, King of Pergamus, was celebrated for his knowledge of botany and pharmacology. He himself cultivated hyosciamus, aconite, cicuta and hellebore, in his gardens, and made a number of experiments upon the activity of these plants. Galen and Marcellus Empiricus refer to two remedies bearing his name ; one, a plaster, of which white lead is the base, the other an internal remedy for jaundice.

Without question, the most celebrated of these pharmaceutic soverigns was Mithridates Eupator, King of Pontius, the implacable, and so long successful, rival of Roman power. His cruelty and violent passions, which raised against him so many enemies, had wrought upon him such a fear of being poisoned, that he made the most prying searches, in order to know every thing that appertained to toxicology. He experimented upon criminals, as also upon himself, with poisonous substances, and daily took a certain quantity of poison with its antidote. He so accustomed himself to the use of poisons that at the moment of his last defeat, wishing to use some upon himself which he always carried about him, he could not succeed in destroying himself by this means. We are assured that having been wounded in battle, the Agares, people of Scythia, had him cured by remedies into the composition of which the venom of the serpent entered. From thence, probably, arose the interest which he attached to the study of poisons and animal venom. Upon the subject of venoms he wrote a work, to which he gave the title of *Theriaca.**

Mithridates is particularly celebrated in medicine as the author of an electuary, the formula of which still figured not long ago in all the Pharmacopœias, and to which he attached great importance as an alexiteric. This composition was so famous, that one of the first cares of Pompey,

* From the word θηρια, venomous beast.

after the death of Mithridates, was to cause it to be sought for among the papers of this prince.

They, in fact, found the formula amidst private memoirs, which for the most part had relation to medical observations, explanations of dreams, and pharmacological researches. Independently of the formula of this celebrated electuary, they found another which they considered as his true counterpoison. It is composed of the leaves of rue pounded together with salt, the kernels of nuts and ripe figs.*

Pompey hastened to translate, through his manumitted slave Lœnus, all the books of receipts belonging to Mithridates, and brought them to Rome as one of the trophies of his victory. The decided taste of Mithridates for pharmaceutical knowledge naturally turned the mind of his contemporaries to analogous researches, and evidently contributed to the progress of Materia Medica. Nearly all the empirics founded their glory in devising new compounds and new antidotes to which they affixed their names. Cratevas dedicated to Mithridates his work upon vegetables, and gave the name of this sovereign to two plants; one is our agrimony, (*Agrimonia Eupatorium, L.;*) the other is the *Mithridatium,* (*Erythronium dens canis,* L.) Pliny mentions a Babylonian by the name of Zachalias, who dedicated to him a work upon precious stones.

The electuary of Mithridates is composed of fifty-four substances; it was the most complicated of all the antidotes then known. It is known that the celebrity of this composition existed for nearly twenty centuries; it only ceased since a few years past to be an article of our dispensatories,

* Bis denum rutæ folium, salis et breve granum
Juglandesque duas totidem cum corpore ficus,
Hoec oriente die pauco conspersa Lyæo,
Sumebat. . . . . .

(2. *Serenus Sammonicus.*)

though it still figures in some of the foreign Pharmacopœias. Linnæus gave the name of *Eupatorium* to a genus of the family Synanthereæ, and Vaillant to another genus of the same family, under the name of *Eupatoriophalacron:* The learned Meibomius has written a voluminous dissertation upon the Theriac and electuary of Mithridates.*

The empirical school includes still some physicans, whose names, under some title, belong to the history of Pharmacy.

Hera, of Cappadocia, left like Andreas of Caristum, under the name of *Nartex*, a work relative to Materia Medica and medicinal preparations. This work embodies a description of every remedy that he had himself proved to possess some virtue. He was the inventor of an antidote, a formula of which Galen has recorded : the same author quotes from Hera, of Cappadocia, some remarks upon the preparation of ointments. But of the empirics, the one who should especially awaken our interests, on more than one account, is Nicander, son of Dammæus, native of Colophon in Ionia, contemporary with Attalus III, Scipio Africanus, and Paul Emilius. Nicander had been an Apollonian priest at Clarus. He distinguished himself in the same time as a poet, physician, and naturalist. He was the author of several poems, all having some bearing upon the natural sciences and Materia Medica. The one entitled *Georgica* treated of Agriculture, and was dedicated to *Attalus Philometor*, the last King of Pergamus, who declared the Romans heirs of his kingdom. Cicero† speaks with eulogy of this work, which thus far has not been handed down to us.

There remains to us at the present day only two poems of Nicander, which are devoted to natural history and toxicology. The first is entitled *Theriaca:* it contains the

* Under the title : *De Mithridatio et Theriaca discursus.* Lubeck, 1652: in 4to.

† *De Oratore*, lib. i. cap. 16.

description of serpents and venomous insects, table of precautions to obviate their bite, and the catalogue of remedies necessary for their cure. The author mentions fourteen species of serpents, seven species of spiders, (*phalanges,*) the lizard, (*stellio,*) cantharides, (not the *L. vesiçat,* but the *meloi cichorei,*) the wasp, Egyptian godfly, besides scorpions, the bee, two kinds of millipedes, (*scolopendra,*) shrew-mouse, salamander, and a number of fishes.

In the poem upon *Theriacs* a number of new and curious observations may be found, relative to the effects of serpents' venom. The description of the *amphisbæna* is identical with that of Linnæus.

Nicander made the discovery that the poison of vipers was placed in a membrane surrounding the teeth. The division established by him between the species of scorpions, is very similar to that of modern naturalists. He made a distinction between day and night butterflies, and was the first to give to the latter the name of *phalenes.* Among the methods indicated by him for curing the bite of venomous animals, baths, external applications, and internal remedies may be noticed. The first are topical compounds of aromatic plants, bruised with wine and sometimes vinegar. As to the second, these are electuaries, more or less compounded, a strange mixture of the most incongruous substances. According to him, the best preservatives against the attacks of venomous animals, and particularly insects, is an ointment prepared from two serpents, male and female, deer marrow, oil, wax, and rose ointment.

The poem upon *Theriacs* contains about eleven hundred verses. The style of the descriptions is betimes dry and barren : it may be conceived indeed that details like these lend little to the developement of the imagination ; but when he paints the sympathies of the patient, he warms, becomes roused, and is wholly poetic. Some ingenious episodes infuse variety into the work, and agreeably divert the sight from some painful pictures.

The second poem of Nicander, which remains to us, has for its title *Alexipharmaca*.* It is a continuation of the poem upon *Theriacs*. In the first the author is wholly occupied with the poisons acting externally; in the last, he is taken up with the internal poisons. He commences by enumerating the substances of the three kingdoms capable of acting as poisons; he describes the symptoms resulting from them, and then points out the proper therapeutic means to control them. Among the animal poisons he speaks of the cantharides of the Greeks, (*Milabre de la chicorée*, Fr.,)† the *Carabus auratus*, L., a kind of goldsmith, the black blood of the bullock, the rennet of the *mammiferes*, the tetraodon, (*Tetraodon lagocephalus*, L.,) the poisonous leech, and salamander. Among the vegetable poisons he described the effects of aconite, coriander,‡ cicuta, the colchicum of Illyria,§ night shade, hyosciamus, opium, and mushrooms. Lastly, in the mineral kingdom he refers to two poisons only, white lead, and litharge.

An incontestible merit of the poem upon *Alexipharmaques*, is to present a sufficiently exact exposition of the symptoms which characterise the different kinds of poisoning. The antidotes are here again topical applications, and electuaries more or less complicated. He directs as an antidote to cantharides, milk taken as a drink, and in injection, or else an emulsion prepared with hog's or lamb's brains, stirred up in a decoction of flaxseed. And to get rid of a leech that may have been swallowed, vinegar is to be drank,

* From αλεξειν, to repulse, and φαρμακον, venom. The word *Alexipharmaque* is synonymous with the words *antidote*, *counterpoison*, and *alexiteric*.

† He spake of cantharides as being suited to raise pustules upon the skin.

‡ The coriander in Egypt has sometimes excited a sort of delirium.

§ Colchicum derives its name from Colchus, where the magician Média often employed it in her enchantments.

or else salt water with a touch of ice in it. In general he chose his counterpoisons from amongst the tonics, aromatics, and heating substances with which he associated sudorifics. In some cases he began by vomiting, at other times he employed purgatives, such as scammony, sweet wine, olive oil, and hellebore. Nicander was engaged in every branch of natural history, but generally showed himself rather the poet than the naturalist.

Notwithstanding the fables and popular opinions with which his writings abound, they exhibit useful documents of the Materia Medica of his time, and they may be regarded as one of the most curious and authentic monuments of the therapeutics of Greece, their form having preserved them from alteration. Several scholiasts, however, have applied themselves to the two works which remain of him.

C. L. Cadet has made the *Theriaques* and *Alexipharmaques*, the object of an interesting and witty dissertation.*

According to Springel the Empirical School had the glory of reviving the study of the natural sciences, and plucking the Materia Medica out of the contempt into which the preceding school had suffered it to fall. Its followers did one thing useful, and showed themselves possessed of the true genius of medicine, in preferring experience to imaginary theories; but they were wrong to open the career to the abuse of polypharmacy, a field entered upon deeper and deeper by the successive schools.

With Nicander terminates the history of the Alexandrian School. The Romans, conquerers of Mithridates, heirs of the Kings of Pergamus,—Greece subjugated and bereaved of her philosophers,—Egypt abandoned by her savants, and delivered up to civil war;—such are the causes of the rapid downfall of this school, the broken wrecks of which we shall see transported to Italy, and under the name of

* Inserted in the *Bulletin de Pharmacie*, vol. ii. p. 337.

Methodical School, in the following century, again form the superstructure of the natural sciences, physical and medical.

ART. XIV. ON THE PREPARATION OF UNGUENTUM SABINÆ. By. J. Toller.

Permit me, through the medium of your Journal, to convey to Pharmaceutists a caution against preparing the ceratum sabinæ in copper vessels, a practice I am authorized in believing to be very general, from the uniformity of the *peculiar* green color which the cerate constantly presents, as well as from having ascertained that this is due to a salt of copper, formed during the preparation of the cerate. Its presence is readily evidenced by any of the usual tests of this metal.

When the cerate is prepared in a porcelain vessel, by means of the water-bath, it is of a yellowish green, and has not so much of the odor of the plant, but it is equally powerful and efficient ; it keeps much longer, without change of color, or becoming rancid.

Lond. Pharm. Journ. and Trans.

ART. XV.—REPORT MADE TO THE ACADEMY OF SCIENCES, PARIS, ON THE NEW PROCESSES INTRODUCED INTO THE ART OF GILDING BY MR. ELKINTON AND M. DE RUOLZ.* By M. DUMAS.

THE importance of this report and of the numerous applications mentioned in it, induces us to give our readers such an extract as may enable them to obtain the principal results mentioned.

1. *Gilding of Brass and Silver by the Mercurial Process at present in use.*

After having carefully scoured the piece, an amalgam of gold is applied to it, then it is burned. The mercury in evaporating leaves the gold on the surface of the object to be gilded; but, in this process, the workmen being incessantly exposed to the contact of liquid mercury or of the vapor of mercury, experience in the highest degree the fatal effects of poisoning by mercurial emanations.

2. *Gilding by the Humid Way.*

This process of gilding, which is very simple in practice, consists in dissolving gold in nitro-muriatic acid, which converts it into perchloride; in mixing the latter with a great excess of bicarbonate of potass, and boiling the whole for a very long time. Pieces of brass, bronze or copper, previously well scoured, are steeped in the boiling liquor, and the gilding is immediately applied, a portion of the copper of the piece being dissolved to replace the gold which is precipitated.

Mr. Wright, in a note addressed to the Academy, gives the following explanation of this process: according to him,

* Abridged from the *Comptes Rendus de l'Academie des Sciences.*

the perchloride would not answer the purpose of gilding, and the protochloride produces the best effects; the long boiling of the perchloride with bicarbonate of potassa causes it to pass to the state of protochloride, on account of the organic matters which the bicarbonate contains. When the organic matters are not present, the operation only very difficultly succeeds; but these matters, which are only accidentally present, may easily be substituted by adding to the liquor, sulphurous acid, oxalic acid, or oxalate of potassa, which quickly reduce the perchloride of gold to the state of protochloride.

The committee of the Academy considers this opinion of Mr. Wright to be correct, and regards the liquid to be employed in gilding by the humid way, as essentially formed of a compound of protochloride of gold and chloride of potassium, dissolved in a liquid impregnated with carbonate, and even bicarbonate of potassa.

The proportion of gold deposited in gilding by the humid way is much less considerable than by the dry way. The committee has ascertained that the best gilding by the humid way fixed at the most 0.0422 gr. of gold per square decimetre, while the smallest deposition by means of mercury fixed at least 0.0428 gr.

3. *Mr. Elkington's Galvanic Process.*

Mr. Elkington takes 31 grammes 25 centigrammes of gold converted into oxide, 5 hectogrammes of cyanuret of potassium, and 4 litres of water, and boils the whole for half an hour, when it is ready for use. When boiling it gilds very quickly, and when cold, very slowly. In both cases, the two poles of a constant battery are plunged into the solution, the object to be gilded being attached to the negative pole at which the metal of the solution is deposited.

In the experiments made by the committee, on Mr. Elkington's process, brass, copper, and silver were gilded.

By this process, the thickness of the layer of gold may

be augmented at will, and the thickness may be estimated by the duration of the immersion.

4. *Galvanic Process of M. de Ruolz, for the application of a great number of Metals to other Metals.*

Gilding.—For applying gold, M. De Ruolz employs a constant battery ; but he used such a variety of solutions of gold, that he found cheaper and more convenient ones than those of Mr. Elkington. Thus, he made use of cyanuret of gold dissolved in the simple cyanuret of potassium, in the yellow ferrocyanuret, and in the red ferrocyanuret of that metal. He also employed the chloride of gold dissolved in the same cyanurets, the double chloride of gold and potassium dissolved in the cyanuret of potassium, double chloride of gold and sodium dissolved in soda, and, finally, sulphuret of gold dissolved in the neutral sulphuret of potassium.

Even chemists must be astonished that the last of all these processes,—that which is based on the employment of the sulphurets,—is the most convenient, and that, applied to the gilding of metals, such as bronze and brass, whose sensibility as regards sulphuration is well known, it succeeds wonderfully, giving the finest gilding and of the purest tone.

Jewellers will derive great benefit from this process, but science will also gain much advantage. Thus, in future, there will be no obstacle to gilding, at a cheap rate, all the copper instruments which so rapidly corrode in our laboratories ; we may procure tubes, capsules, and crucibles of gilded copper, which will be good substitutes for vessels of gold, which are sometimes necessary, and which no chemist of the present day possesses.

Among the pieces laid before the Academy, there is a gilded brass capsule, which has very effectually resisted the action of boiling nitric acid.

Steel and iron are very well and solidly gilded by this

method, which bears no comparison, in this respect, with the very imperfect processes of gilding on iron and steel. Only, as iron has little affinity for gold, the process is commenced by putting on the iron or steel a cupreous pellicle, which favors the adherence of the gold, and fulfils the office of what is called in dyeing, a mordant. Desert knives, surgical instruments, arms, and laboratory utensils may receive this layer of gold with economy and facility.

Silvering.—All that we have said with regard to the applications of gold, applies with equal force to those of silver. M. De Ruolz has likewise been able, by means of silver dissolved in cyanuret of potassium, to apply it with the greatest ease.

Silver may be applied to gold and platinum, and also to brass, bronze and copper, in such a manner as to substitute plating. Tin, iron and steel are also easily silvered; for the use of chemists, we have proved that a capsule of brass silvered over, may answer the purpose of a silver one, to the extent of resisting the fusion of hydrate of potassa. It will not be uninteresting to look forward to the application of these new processes to the preservation of balances, physical instruments, household utensils, those employed by confectioners and druggists, in the preparation of food or medicine containing acid, if iron or cast iron be required. These metals, fashioned into covers, (dish-covers?) and covered with a layer of silver, will favor the popular use in France, on account of their cheapness, of objects already common in England. Many covers of silvered iron are already made, by other more expensive and much less perfect processes, at Birmingham, and are in common use in many families in England.

Platinising.—By making use of the double chloride of platinum and potassium, dissolved in caustic potassa, a liquor is obtained which allows of platinising with the same facility and promptitude as in gilding or silvering.

Chemists will find, in this process, a means of procuring

large capsules of platinised brass, which combine cheapness with the necessary resistance to saline or acid solutions.

Armorers will turn to account, under different forms, this means of preserving oxidisable and sulphurisable metals, used in the manufacture of arms.

Platinum, thus applied, may be obtained from the crude solution of platinum ore, as the metals which accompany it do not injure the effect. This process reduces the price of platinum to that of silver, and seems to open for platinum, now but little employed, an unlimited sale, particularly in the manufacture of chemical products, and in the concentration of acids (especially sulphuric acid.)

The extensibility of platinum is such, that, by the processes of M. De Ruolz, 1 millegramme of platinum is capable of uniformly covering a surface of 50 square millimetres; which corresponds to a thickness of $\frac{1}{100000}$ of a millimetre, analogous, as is evident, to the most attenuated pellicle of which we can form a just idea by direct observation.

Coppering.—The same process is used as for silvering, namely, by means of cyanuret of copper dissolved in the alkaline carbonates ; but the precipitation of copper is more difficult than that of the precious metals.

Leading.—By acting on the solution of oxide of lead in potassa, by means of the pile, iron plate, iron, and all the metals in general are leaded.

The manufacture of chemical products will also be benefitted by this discovery, in thus obtaining iron boilers lined with lead, and in which the solidity of the iron is united with the resistance of lead to the chemical actions of saline solutions and weak acids.

Tinning.—The new processes may be extended in applications, by giving an easy and prompt means of tinning

copper, bronze, brass, iron, and cast iron itself, by operating without heat, on all kinds of utensils.

Cobalting, Nickeling, &c.—M. Dumas exhibited to the Academy several pieces of metal covered with nickel or cobalt. Nickel is very readily applied to iron, which may become of great importance.

Zincing.—Among the experiments tried by M. De Ruolz those which refer to the zincing of metals, and of iron in particular, were very interesting to the committee.

Zinc, when applied to iron, doubly preserves it; it protects it like a varnish, and likewise by a galvanic action. This peculiarity accounts for the success which zinced iron has obtained in all the applications in which iron, or iron plate employed cold, did not require all their tenacity, and could support additional expense.

The zincing of iron, made by steeping iron in a bath of melted zinc, has some inconveniences ; besides, the iron combining with the zinc, constitutes a very brittle superficial alloy; the iron loses its tenacity, a circumstance which is not perceived, however, except in trying to zinc fine iron wire or very thin plates. Besides, the surface, thus covered with a layer of a not very fusible metal, is always ill-formed.

Thus, by this process fine iron wire cannot be zinced ; it would become fragile and deformed : bullets cannot be zinced, as they become misshapen and no longer of the same calibre.

Manufacturers, and those concerned in military affairs and the fine arts, will learn with interest that the processes of M. De Ruolz enable us to zinc, in an economical manner, iron, steel, and cast iron, by means of the pile, with the solution of zinc ; by operating without heat, and consequently not interfering with the tenacity of the metal ; by applying it in thin layers, and by thus preserving the general forms of the pieces, and even the appearance of their minutest details.

The thinnest plate may receive this preparation without becoming brittle, and may thus be turned to account in roofing buildings.

The committee wished to ascertain that cast iron, and bullets in particular, might be zinced. This application must excite the attention of the ministers of war and marine, especially the latter, for bullets are so rapidly altered at sea, that their dimensions are very soon modified to an extent injurious both to the justness of the tier, and the duration of the pieces. The committee laid a zinced bullet on the table of the Academy.

The Chemist.

ART. XVI.—PLASTER OF CROTON OIL.

By M. Bouchardat.

Croton oil acts as a valuable repulsive in many cases. Applied to the skin, it produces a very considerable vascular eruption, but much less painful than that of the pustules caused by the employment of stibial tartar under the form of frictions. It is usually prescribed pure, or mixed with oil of sweet almonds. This means of administration is inconvenient; for crotonic acid, the active principle of the oil, is volatile, and is often dissipated without producing any effect, or else causes inflammation of the skin of the fingers used in rubbing. To avoid these inconveniences, M. Bouchardat prepares croton oil in the following manner:—

He melts, on a gentle fire, 80 grammes of diachylon plaster, and mixes with this semifluid plaster, 20 grammes of croton oil; he then spreads the plastic mass on calico, so

as to obtain a very adhesive croton oil plaster, which causes a powerful irritation of the skin.

M. Caventou, in a note in reply to M. Bouchardat's Memoir, wished to establish his right to the propagation of croton oil as a therapeutical agent. He thinks that the heat to which the oil is submitted at the time of mixing must injure its properties, which would be true if M. Bouchardat did not add the croton oil to the liquefied and partially cooled plaster. M. Caventou prefers the following formula:—

℞.	Hog's lard	$2\frac{1}{2}$ parts
	Wax	$\frac{1}{2}$ part.
	Croton oil	1 part.

The wax and lard are melted together, and the croton oil is incorporated when they are cold.

Ibid, from Bulletin de Therapeutique.

ART. XVII.—ON RESIN OF GUAIACUM.

By M. Deville.

Resin of guaiacum gave, by distillation, three distinct substances:—

1. An oil boiling at 117° C.

2. An oil boiling at 212° C., more dense than water, while the other is lighter.

3. A crystallised substance, volatile without decomposition.

This work, whose results would appear, at first sight, to have great analogy with those which I have published con-

cerning balsam of tolu, made me hope that I might find in these two resins, analogous, if not the same principles. Knowing that several chemists are now studying guaiacum, and being desirous of preserving priority for investigations long since commenced with regard to all the resins, and guaiacum in particular, I have communicated these results, although incomplete, in the hope that I shall very soon terminate them and submit them to the Society.

M. Pelletier informed the Society that he also was engaged in the examination of guaiacum, and that he discovered in that substance the presence of two resins, one of which was capable of combining with the alkalis, while the other did not possess this property. Having submitted guaiacum to distillation, he obtained, like M. Deville, three different substances:—

1. A light oil.

2. A crystallisable matter, perfectly clear, which volatilises with the aid of steam.

3. A dense oil, which appeared to him identical with creosote.

Ibid, from Trans. Société Philomatique de Paris.

MINUTES OF THE PHARMACEUTICAL MEETINGS.

January 2d, 1843.

Professor Carson in the Chair.

The minutes of the preceding meeting were read and adopted.

Reports of Committees being in order, Augustine Duhamel, on behalf of the committee to whom was referred the subject of an adulteration of Jalap, read their report, (see January No. of this Journal.)

The report was adopted.

Dr. Carson observed that he had subjected some of the false jalap to microscopical observation, and that its powder was very similar to that of the true jalap.

The committee to whom was referred the paper on Extract of Senega, reported in favor of its publication, and their report was adopted.

The commissions charged with the examination of the Essays of Augustine Duhamel, on "Fuligokali and Anthrokokali," and on "Beaked Hazel," recommended their publication, which was approved.

Henry W. Worthington exhibited a specimen of the black oleaginous juice, contained between the outer and inner shells of the cashew nuts, (Anicardium occidentale,) so well known in the West Indies for its irritating qualities.

He stated that it had been extracted from the bruised nut by ether, by the subsequent evaporation of which the juice was obtained. He had suffered seriously from its effects, and could corroborate the statements of writers on th subject.

Dr. Carson observed that a formula for Syrup of Pipsissewa was much wanted, and invited the attention of the

members to the subject, with a view of eliciting correct directions for its preparation.

Dr. Bridges called the attention of the meeting to the apparatus of Dr. J. K. Mitchell, of this city, for obtaining carbonic acid in a liquid state. After some observations relative to the mode of using the instrument, Dr. Bridges observed that he had previously prepared a quantity of the liquid carbonic acid, for the purpose of exhibiting the process of obtaining it in a solid form by means of an additional instrument. The members were gratified by inspecting the solid acid, together with a quantity of mercury which had been solidified by a mixture of the acid and ether.

February 6th, 1843.

Professor Bridges in the chair.

The journal of the last meeting was read and adopted.

The Journal de Chimie Medicale for December and November, 1842, the Pharmaceutical Journal for October and November, 1842, and the American Journal of Pharmacy for January, 1843, were presented to the meeting.

William Procter, Jr., in accordance with the request of Dr. Carson at the last meeting, offered the following formula for Syrup of Pipsissewa, viz.:

Pipsissewa, four ounces.
Sugar, twelve ounces.
Water, a sufficient quantity.

Macerate the Pipsissewa, finely bruised, in eight fluid ounces of water for thirty-six hours, and then subject it to displacement, until one pint of fluid is obtained. Reduce this by evaporation, to eight fluid ounces, add the sugar, and form the syrup in the usual manner.

The coriaceous character of the leaves requires that they should macerate for a length of time, to be completely permeated by the menstruum.

One fluid ounce of this preparation contains the strength of two drams of Pipsissewa.

Dr. Carson exhibited a colored drawing of the Balsamodendron myrrha, copied from the work of Nees Von Esenbeck.

Henry W. Worthington called the attention of the meeting to a specimen of "pills of protoiodide of iron," and the formula for their preparation. This formula is composed after that of Dupasquier, but the pills contain a greater percentage of the ferruginous iodide, and is as follows, viz.:

Take of Iodine, ʒij.
Iron filings, ʒij.
Water, ℥ij.
Honey, ℥ss.
Tragacanth, ʒiss.

Add the iodine and iron filings to one fluid ounce of the water, and let it stand, with occasional agitation, until the fluid has acquired a slightly greenish color, then filter, and add the honey, and subsequently the Tragacanth formed into a paste, with the remaining water. Mix them intimately together, evaporate to a pilular consistence, and divide the mass into one hundred and twenty pills. These pills, when well prepared, should at first be nearly colorless and translucent. Each pill contains one grain of iodine united to its equivalent of iron.

Ambrose Smith exhibited a specimen of crystals obtained from rectified oil of turpentine, in which they had probably been formed by the absorption of oxygen. They melted, and wholly sublimed without change, when subjected to heat. He further directed the attention of the members to an improved Daniell's Battery.

Dr. Bridges observed, that in connection with the subject of Mr. Worthington's remarks he would state, as the result of some experiments, that the officinal solution of iodide of iron, which so frequently becomes dark colored, owes that color in great measure to some change which the coloring matter of the honey undergoes. He found that by

agitating a claret colored solution of the iodide (which had been long standing) with iron filings, but a slight change was produced in its color, but when it was treated with animal charcoal in the same manner, it was deprived of nearly the whole of its dark hue, thus proving that the change of color was *not* due to the decomposition of the iodide of iron.

Dr. Bridges further stated that two specimens of the preparation, one made in 1840 and the other early in 1842, yet retained their light color, which he considered attributable to the purity of the honey employed in their preparation, the first having been decolorized by animal charcoal, and the second formed with very pure white honey.

William Procter, jr. presented a specimen of *amygdaline,* which he had obtained from peach kernels; and by means of a solution of *emulsine*, prepared from sweet almonds, exhibited the reaction between the latter substance and amygdaline, with the consequent production of oil of bitter almonds, hydrocyanic acid, etc.

Augustine Duhamel read an interesting essay on the History of Pharmacy during the classic ages, the whole constituting a chapter of Cap's History of Pharmacy, recently published in France, and which he had translated.

Being no further business, the meeting adjourned.

March 6th, 1843.

Professor Bridges in the chair.

The minutes of the preceding meeting were read and adopted.

The Journal de Chimie Medicale for January, 1843; the Pharmaceutical Journal for December, 1842, and January and February, 1843; and six numbers of the Journal of the Franklin Institute, were presented to the meeting.

Dr. Bridges, on behalf of George W. Merchant, Pharmaceutist, of Lockport, New York, presented the following specimens of minerals and fossils, viz.:

1 Specimen of Fibrous Sulphate of Strontia.		
1	"	anhydrite.
3	"	selenite.
1	"	selenite and granular sulphate of lime.
2	"	dogtooth spar.
3	"	" and magnesian carbonate of lime.
2	"	magnesian carbonate of lime.

Fossils.

1	"	fucoides Alleghaniensis.
5	"	trilobites.
1	"	ecrinites?
5	"	miscellaneous.

On motion of Augustine Duhamel it was, resolved, that the thanks of the College be presented to the donor, for his handsome and valuable contribution to the cabinet of the institution.

Joseph C. Turnpenny, on behalf of Thomas J. Husband read an interesting paper on syrup of sarsaparilla, which was referred to William Procter, jr., Augustine Duhamel, and Ambrose Smith as reporters.

Augustine Duhamel presented a specimen of hydriodated opodeldoc, containing one dram of the alkaline iodide to the ounce; and also a sample of syrup of Pareira brava, containing two ounces to the pint.

Dr. Carson exhibited a drawing of the Dryobalanops camphora, together with specimens of the camphor it yields, and the volatile oil from which the camphor is deposited in the cavities of the tree.

A specimen of Phloridzine, the bitter principle of apple-tree bark, was presented to the meeting by Dr. Bridges, on behalf of William Procter, jr., not present.

Some observations on the opodeldoc of the U. S. Pharmacopœia, were made by Augustine Duhamel, who suggested

the appointment of a committee to investigate the subject; which was referred for future action.

On motion, the meeting adjourned.

April 3d. 1843.

Dr. Bridges in the chair.

The minutes of the last meeting were read and adopted.

Reports of committees being in order, William Procter, jr., on behalf of the commission appointed at the last meeting to consider the paper of Thomas J. Husband, read their report; which was accompanied by the products resulting from the experiments contained in the report. After due consideration of the report and attached specimens, it was adopted.

William Procter, jr. called the attention of the meeting to specimens of ointment of extract of nutgalls, and of the extract itself, prepared by Daniel S. Jones, a recent Graduate of the College. He stated that nutgalls when treated with water by the displacement process, yield 63 per cent. of dry extract, about two-thirds of their weight, and proposed an ointment formed by triturating two scruples of the extract of galls, with a little water, and afterwards with seven drams of lard as a substitute for the officinal ointment made with ordinary powdered galls.

When thus made, this ointment embodies all the activity of the nutgalls, without that gritty, uneven character of the ordinary ointment, due to the uneven division of the powder, and which amounts to an objection to its use in some cases of extremely irritable hemorrhoids.

The ointment possessed a perfectly uniform consistence, but was objected to as being too soft. Simple cerate was proposed as a substitute for lard. In the ordinary ointment, the dry bulky nature of the powdered galls compensates for the softness of the lard. In other respects

the proposed ointment was approved of as an efficient and eligible preparation.

A specimen of urea, and its nitrate and oxalate, were presented to the meeting by William Procter, jr., made by the formula of Liebig.

The suggestion offered at the last meeting, which was postponed for the action of this meeting, was again referred for future consideration.

On motion, adjourned.

MISCELLANY.

Detection of the presence of Potato Starch in the Powder of Rice or Arrow-root, by means of Diluted Hydrochloric Acid. By M. Scharling.—If powdered rice or potato starch be mixed with concentrated hydrochloric acid, in the proportion of about one part of the former to one and a half or two parts of the acid, they form almost immediately a thick mucilage. The mucilage of potato-starch is nearly transparent; that of the rice, on the contrary, is opaque. They both emit the odor of formic acid.

If a mixture of hydrochloric acid and water be used, a very different action is exercised on the two substances already named. The potato starch forms, in a very short time, a mucilage so thick, that the morter may be lifted up by means of the pestle used in making the mixture; while the powdered rice does not acquire a similar viscosity in less than twenty-five or thirty minutes. If the rice-powder contains from four to six per cent. of potato-starch, it is easy to detect the admixture by means of this re-agent. For this purpose a mixture of equal parts of hydrochloric acid of commerce and water should be used.

Arrow-root comports itself in the same manner as rice-powder, with the hydrochloric acid, while wheat-starch resembles potato-starch in this respect.

M. Marezeau, as is known, has proposed hydrochloric acid as a means of detecting potato-starch in flour, by the strong smell of formic acid which it developes in contact with the acid; but as the same effect is produced, in this respect, with rice-powder and arrow-root as with potato-starch, the hydrochloric acid cannot be used in this way for detecting the admixture of these latter.—*Pharm. Journ. and Trans., from Analen der Chemie und Pharmacie.*

On the Danger of Keeping Milk in Vessels of Zinc. By Dr. Elanes, of Berlin.—I scarcely could have believed that zinc vessels could again have come in use for keeping any fluids used for alimentary purposes. as Vauquelin proved, forty years ago, that such will contain,

after a short time, a considerable quantity of zinc in solution. I have found, by experiment, that a solution of sugar, which had stood only a few hours in a zinc vessel in the summer, contained a considerable amount of zinc salts. It has been often stated, that the cream will separate more easily from milk if the latter be kept for a short time in zinc vessels. As, however, it is known that milk will become much sooner acid than a solution of sugar, it is the more to be apprehended that some zinc will be dissolved, and such milk will be the more noxious, as it is well known that even a small amount of zinc will cause violent spasmodic vomiting.—*Ibid, from Gewenb-blatt fur Sachsen.*

New Method of Preparing Cinnamic Acid. By Mr. G. Heaver.—Having recently had occasion to prepare, amongst other chemical products, a quantity of cinnamic acid, and finding that Turner's process for making it from oil of balsam of Peru, was a tedious and expensive operation, and that the product was exceedingly small in proportion to the quantity of balsam employed, I was led to make some experiments with a view of preparing this acid more economically. This I soon found might be effected by distilling genuine balsam of Tolu, the price of which is now very low. On subjecting this article to a gentle heat in a retort, it fuses, and a little water and fragrant volatile oil first come over; these are succeeded by the cinnamic acid, which distils over in the form of a heavy oil, condensing in the cool part of the neck of the retort into a white crystalline mass. This gradually becomes contaminated with an empyreumatic oil, that rises towards the end of the operation. The acid may be freed from this oil by pressure between folds of filtering paper, and afterwards dissolving in a large quantity of boiling water, from which it deposits, on cooling, in minute colorless crystals.

This process is very productive, so much so, that the balsam of Tolu I employed, yielded an eighth of its weight of pure acid—minus a few grains.—*Ibid, from Annals of Chemistry and Practical Pharmacy.*

Mezereon Cerate.—The following formula is given by Mr. Pleischl for the preparation of this cerate.

Digest the fresh bark of mezereon, collected at the period of inflorescence of the plant, in spirit of wine, for two or three days; pour off the liquor and add fresh spirit, repeating this process until the bark is exhausted of its soluble parts. Mix the liquors thus obtained together, and submit them to the action of hydrate of lime, prepared with three parts of water to one of quick lime. The hydrate of lime should be used in the proportion of one part, by weight, to three parts of meze-

reon. Digest these together until the color becomes a yellowish green, then distil off the greater part of the spirit. Add water to the residue, when a green substance of a soft consistence will be separated, and one part of this is to be mixed with four parts of yellow wax, and eight parts of olive oil, to form the cerate.—*Ibid, from Buchner's Repertorium.*

Application of the Residue of Iron Pyrites, employed in the Manufacture of Oil of Vitriol. By M. Berrael.—The manufacture of oil of vitriol from iron pyrites, in the countries in which this substance is abundant, being advantageous in a commercial point of view, it is important to discover a profitable application for what has hitherto been considered as the refuse of the process.

In a manufactory in Belgium, where sulphuric acid, and also soda is made, the residue left after burning the pyrites, and which contains sulphate of iron, is mixed with sea salt in excess, and heat applied in a proper apparatus; hydrochloric acid is thus obtained, and sulphate of soda, which is purified by solution and crystallization. The remaining peroxide of iron is separated, by washing, into two parts: that which is in the finest powder, being dried and mixed with grease, is used as an antiattrition for machinery, and answers the purpose well; the coarser powder is made into small pellets, dried and treated as iron ore.

In manufactories where soda is not made in connection with sulphuric acid, instead of extracting the sulphate of iron from the burnt pyrites, it is found more advantageous to distil the residue (the sulphate of iron being already dry) so as to obtain the fuming acid.

It is easy to arrange the apparatus in such a manner, that the sulphurous acid resulting from the decomposition of a part of the sulphate during the distillation, may be conducted into the leaden chambers. Nothing is lost in this process, the residue being obtained in the state of colcothar.—*Ibid, from Comptes Rendus.*

Tests for Phosphorous Acid. By M. Wohler.—Some phosphoric acid, when examined to ascertain whether it contained arsenic, gave by heat, with sulphurous acid, a yellow precipitate of sulphuret of arsenic. This phosphoric acid contained, as was shown on a more attentive examination, arsenious and phosphorous acids.

It was seen, indeed, that phosphorous acid possesses the property of being converted into phosphoric acid by the action of sulphurous acid, especially when aided by heat. This transformation is caused by the decomposition of the water; and there is a formation of sulphuretted

hydrogen, and a reciprocal decomposition of this sulphuretted hydrogen and the sulphurous acid into water and sulphur.

If phosphorous acid be mixed with a solution of sulphurous acid in water and heated, an abundant precipitate of sulphur is immediately formed. It is a very good means of discovering whether phosphoric acid contains phosphorous acid, as is often the case: if it contains arsenious acid at the same time, it turns yellow on the precipitation of sulphuret of arsenic.

The presence of phosphorous acid is very easily detected by means of a small gas apparatus, similar to Marsh's. Indeed, if phosphoric acid containing phosphorous acid be mixed with a liquid disengaging hydrogen gas, phosphoretted hydrogen is formed, which may be recognized by its smell alone; and if this gas be inflamed, it burns with a whitish, brilliant flame, very different from that of pure hydrogen gas. If this flame be directed against a porcelain plate, there is always remarked, and in a very evident manner, especially if the place be not too light, a circle of green light in the flame thus spread out, as when phosphorous burns in confined air or in chlorine.

Chemist, from Journn. de Pharm.

Crystals of the Essences of Turpentine and Citron. By M. Deville.—M. Deville presented to the Philomatic Society of Paris, at its meeting of the 27th of November, 1841, two new products which he had recently obtained under the form of crystals, remarkable for their beauty, transparency, and lustre.

The first was hydrated essence of turpentine, and the second, essence of citron.

He read the following observations on this subject:—

Mr. Wiggers announced that he had obtained fine crystals of the former substance by means of a mixture of alcohol, nitric acid, and essence of turpentine. I have repeated this experiment, which perfectly succeeded, and I obtained two or three hundred grammes of substance at the end of a month of contact between two kilogrammes of the mixture. In an analogous manner, I was able to prepare the hydrated essence of citron, not previously known.

These two substances crystallise with remarkable distinctness. They are isomorphous, and their forms are right rectangular prisms. They are likewise isomeric, and their formula is $C^{40}\ H^{32} + H^{12}\ O^{6}$, a formula which Dumas and Peligot had already assigned to hydrated essence of turpentine.

It appeared to me that there should also exist a liquid hydrate of the two essences.

Terebene, in the same circumstances, furnished a crystallised body. I have not yet obtained it in sufficient quantity for examination.

All these experiments, which have been commenced on a great number of essences, require a considerable time before they can be concluded. It is for this reason that I now introduce them to the notice of the Society, although they are yet incomplete.

Ibid, from L'Institut.

Analysis of a Substance secreted on the Hand of a Gouty Person. By O. Henry.—This substance showed itself after violent attacks of gout under the form of a very thick, glutinous secretion, and was, as it were, sprinkled with a white matter. A very small quantity examined by Henry was formed of the following matters:—

1. A large quantity of albumen, amounting to 4-5ths of the whole.
2. Lactic and phosphoric acids.
3. Chloride of sodium and phosphate of lime.
4. Evident traces of urate of soda.

Ibid, from Journ. des Connoissances Medicales.

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ART. XVIII.—OBSERVATIONS ON ARUM TRIPHYLLUM.

By Daniel S. Jones.

(An Inaugural Essay.)

The plants of the natural order Aroideæ, or Arum tribe, are all distinguished by a taste of burning acridity, which varies in different species. The most remarkable is the *Dieffenbachia Seguina*, or *Dumb Cane*, a native of the West Indies and South America, which possesses it in so great a degree as to be highly deleterious. When a small quantity of this plant is chewed it is said to cause intense pain, a swelling of the tongue, and suspension of the power of speech. According to Pereira, two drams of the recent juice have been known to prove fatal in two hours. Milder species, as the *Arum maculatum* and *A. triphyllum*, have been employed in medicine, and the latter has been placed in the secondary list of the United States Pharmacopœia.

Notwithstanding this acrid property is so marked in this family of plants, yet, so far as I have been able to learn, all attempts to isolate the principle or principles upon which it depends, or even to retain it, have proved unsatisfactory.

Dr. Bigelow, in his Medical Botany, has given a series of experiments on Arum triphyllum, tending to illustrate

its chemical constitution. He informs us that, after having macerated the recent root in all the menstrua ordinarily employed, as water, alcohol, ether and olive oil, without success, he submitted a portion connected with the leaves and stalks to the boiling temperature under water, when a small quantity of gas was obtained, which was thought to contain the active principle. This gas produced a cloudiness in lime water, and exploded on the application of a lighted taper.

Dr. Bigelow intimated an intention of resuming his researches, which he left in an incomplete state; but I have been unable to find any additional remarks from his pen.

The following observations are intended to illustrate this subject more fully; and it is believed that the care which has been extended to render them correct makes them worthy of confidence.

Four ounces of the recent and finely sliced root were placed under an inverted glass funnel, the neck of which was accurately stopped with a small glass jet having its point sealed. The funnel was entirely filled, and partially surrounded with recently boiled water, the temperature then raised to the boiling point, and the ebullition continued for two hours, until the root ceased to give off gaseous matter, and had entirely lost its acrimony. It was then suffered to cool. About two cubic inches of gas was obtained. It supported the respiration of an insect without apparent inconvenience to the animal; and a portion, when agitated with lime water, produced a slight opalescence; but the greater part remained unabsorbed: finally, when the gas was caused to issue from the jet by sinking the vessel in water, a lighted taper applied to it caused neither explosion nor inflammation.

To test the destructibility of the acrid principle by heat more decidedly, the following experiment was made. Into a large and strong glass tube, sealed at one end, a portion of

the sliced root was introduced, after which the tube was bent at an obtuse angle near the middle, and the other end hermetically sealed. The empty end of the tube was placed in a freezing mixture, and the other, containing the sliced root, heated gradually and regularly until all the moisture of the root had passed over to the refrigerated end of the tube. The whole was then permitted to acquire the temperature of the atmosphere, and the tube divided. The distilled fluid was found to possess the peculiar odór of the root, but *none* of its acrimony. The gaseous contents of the tube, when inhaled, caused no irritation, and was not inflammable. The root had been entirely deprived of its acrid burning taste.

It will be seen that the results of the above experiments do not accord with those of Dr. Bigelow, as the gaseous matter contained but a trace of carbonic acid, and was neither inflammable nor explosive.

Whether it is a product of the decomposition of the active principle, or whether it is atmospheric air absorbed by the root, and subsequently given out, has not been determined.

Liebig* states, at the end of his chapter on volatile oils containing sulphur, that "the volatile oil of the *Arum maculatum* belongs to this class;" and the same statement is made by Professor Graham; but I have been unable to find an account of this product, as no mention or reference is given by either of these authors: it must, however, be evident, that if such an oil exists in the *Arum triphyllum*, it should have been obtained in the tube experiment.

Quantitive examination of the principal ingredients of the root of Arum triphyllum.

Fecula.—One thousand grains of the root, previously washed, was rasped finely, agitated with water for some

* Organic Chemistry in Turner.

time, and then washed on a sieve until all the fecula and soluble matter had been removed. The remaining fibrous substance, when dried at the temperature of 100° Fahr., weighed seventy-six grains. The washings and fecula were then thrown on a filter, and the latter, after being well washed with water, and dried at 100° Fahr., weighed one hundred and seventy-one grains, or 17.1 per cent. The root used in this experiment was collected on the first of November, and rasped soon after being removed from the ground. The roots collected on the 7th of May yielded 10 per cent.; that obtained on the 8th of August, 11.3 per cent. It will thus be seen that, as the season progresses, the deposition of fecula increases from 10 per cent. in May, to 17 per cent in November, when the top has entirely disappeared from the plant. The roots taken from plants growing in different situations present various aspects. As a general rule, those plants that are found in moist, shady situations, have larger tops and smaller roots than those which grow in open places; and the latter always contain the largest amount of fecula. It has been observed, that when the plant is subjected to culture in a rich, somewhat elevated soil, fully exposed to the sun's influence, the root attains a much larger size, and yields a corresponding increased quantity of starch. It is also free from disease, which is apt to accompany the uncultivated, particularly when [growing in a very moist soil. This fact renders it probable that *Arum triphyllum* is susceptible, under proper treatment, of affording sufficient fecula to render its cultivation profitable, with a view to supplying the market with arrow root. Dr. M'Call, of Georgia, in a note communicated to Dr. B. S. Barton, (Phil. Med. and Phys. Jour. vol. ii, p. 84,) states that he obtained 25 per cent. of fecula from the root of this plant. As has been previously stated, the greatest yield in my hands has been 17 per cent. Doubtless the climate of Georgia may have had an influence in

the production of this constituent of the root, which is not exerted under our less favorable latitude.

The fecula of *Arum triphyllum* has a pure white color, without odor or taste. The granules, as ascertained by microscopical observation, are nearly spherical, transparent, and when compared as to size with the principal varieties of fecula, were found to approach most nearly that of wheat, yet they are even smaller on an average than the latter. This accounts satisfactorily for the absence of that crystalline lustrous aspect, so marked in some species of fecula, and which is a beautiful characteristic of the *tous les mois*.

The jelly formed by treating arum fecula with boiling water, when compared with that of Bermuda arrow root, was found to be equally free from taste or odor, and to possess even more consistency. When sweetened, etc., it affords a diet in all respects equal to that popular article, and might readily take its place.

Vegetable Albumen.—One thousand grains of the unpeeled root was rasped, and triturated with water until converted into a pulp, and then washed with the same fluid until completely deprived of soluble matter. The clear liquid, thus obtained, yielded precipitates with corrosive sublimate and ferrocyanuret of potassium. When its temperature was raised to 212° Fahr., a coagulum was formed which, when collected on a filter, washed with water, and dried at a temperature of 100° Fahr., weighed ten grains.

Gum.—Subacetate of lead was added to the filtered liquid remaining from the last operation, until it ceased to cause a precipitate; this was collected on a filter, washed with water, dried, and weighed. This precipitate amounted to 16.5 grains, representing 10.1 grains of gum.

After the separation of the gum in the last experiment, hydrosulphuric acid was passed through the clear liquid until the lead was precipitated, and then filtered, and evaporated to dryness. Thirty-two grains was thus obtained.

This extract was dissolved in half an ounce of water, and

half a dram of yeast added to the mixture; the whole was then placed in a small flask, and connected, by means of a tube, with an inverted jar over mercury. After the fermentation had ceased, a quantity of gas was found in the jar over the mercury, which was rapidly and entirely absorbed, when a piece of moist caustic potassa was introduced into it.

The residue, after fermentation, was distilled until one-sixth of its bulk had passed over into the receiver. This had an alcoholic odor, and on agitating it with carbonate of potassa to separate the water, the remaining fluid burned, on the application of a lighted taper, with a blue flame, and possessed other characteristics of alcohol. The capacity of the extract to yield alcohol and carbonic acid, by fermentation, is sufficient evidence of the existence of *sugar.*

One thousand grains of the dried root yielded, by incineration, a residue weighing forty-five grains, of which fifteen were soluble in boiling water. The solution thus obtained, effervesced with acids, possessed a strong alkaline reaction, and formed salts with nitric acid and bichloride of platinum, having the characters of nitrate of potassa and platino-bichloride of potassium. The residue left after treating the ashes with boiling water, was digested in nitric acid, diluted and filtered. Tested with oxalate of ammonia and ferro-cyanuret of potassium, it gave evidence of the existence of *oxide of iron* and *lime.*

Seeds.—The fruit of the *Arum triphyllum* present several features of interest. The exterior or pericarp, when in a green state, possesses the acrimony of the plant in a concentrated degree, but as the season advances it becomes scarlet and pulpy, entirely loses its acrimony, and in this state affords a well relished food for many of the feathered tribe.

Within this pericarp are several hard seeds, consisting severally of a tough envelope enclosing a white amylaceous interior substance. This envelope of the seeds possesses the

property of communicating an intense red color to several alkaline solutions, particularly solution of ammonia, which bears a strong analogy to that of orcine and erythrine.

When the seeds, deprived of their pericarp, are macerated in solution of ammonia without contact of the atmosphere, no change takes place in their appearance; but if atmospheric air or oxygen be present, they soon become dark colored, and the solution gradually acquires an intense red hue. These are the precise conditions requisite for converting orcine, the crystalline substance existing in the *Lichen dealbata*, into orceine, the crimson coloring matter of Archil, in a pure state.

With these ideas in view, a portion of the bruised seeds was boiled in alcohol, the alcoholic liquid evaporated to dryness, and the product thus obtained treated with cold water until it ceased to be dissolved. The aqueous solution, thus obtained, was carefully evaporated to the proper consistence, and set aside. The fluid was gradually converted, by spontaneous evaporation, into a transparent varnish, without the slightest evidence of crystallization.

When this substance is dissolved in solution of ammonia and exposed to the air, the solution gradually assumes a deep red color. The addition of acetic acid to it, after removing the excess of ammonia by heat, precipitates the coloring matter in red flocks, which redissolve in an ammoniacal solution. It is also wholly precipitated by chloride of tin, nitrate of mercury, sulphate of zinc, acetate of lead, and chloride of barium, forming compounds having various shades of brown; sulphuric acid also precipitates it.

By suffering the deep red ammoniacal solution to evaporate, a dark colored extract-like matter is obtained, which is but partially soluble in water, to which it communicates a reddish brown tint, but is redissolved by solution of ammonia.

The seeds, when treated with a solution of carbonate of soda or caustic potassa, yield a similar coloring matter.

The coloring property resides only in the exterior envelope of the seeds, as their interior substance, or the pericarp enclosing them, do not possess it.

When an alcoholic tincture of the seeds is evaporated, a small quantity of yellow fixed oil separates.

In conclusion it may be observed, that the root of *Arum triphyllum* contains:

1. A peculiar, pungent, acrid principle, which resembles, in its leading characteristics, that contained in other species of the Arum genus, and which has not been isolated.
2. Fecula.
3. Vegetable Albumen.
4. Gum.
5. Sugar.
6. Extractive Matter.
7. Lignin.
8. Salts of Potassa and Lime.

To which should be added the substance contained in the seeds, which yield a deep red color with ammonia, and a yellow fixed oil, which they also contain.

ART. XIX.—PREPARATION OF CALOMEL IN A STATE OF MINUTE DIVISION.

BY M. SOUBEIRAN.

Both medical experience and chemical science tend to prove that the minute division of calomel adds to its medicinal energy. Porphyrization is not sufficient to effect this purpose, it affords a yellow powder, which is never sufficiently impalpable. Joseph Jewel was the first who discovered another method of pulverization. He proposed to conduct the vapour of calomel into a vessel containing water in a state of ebullition, and the steam from the latter, mixing with the vapour of the calomel, caused its speedy aggregation in the form of an impalpable and uniform powder.

If this process of Joseph Jewel's be not absolutely impracticable, it is at least very difficult to perform, hence all those who have attempted to apply this process, have soon given it up. In 1822, M. Henry, convinced from practical experience that he could never arrive at any satisfactory result by adhering strictly to Jewel's process, suggested a modification of the apparatus, which has been introduced into our laboratories, and is mentioned in most Pharmaceutical treatises. M. Henry's modification of the process consisted in having the steam generated in a separate vessel from that into which the vapour of the calomel is conducted. It is unnecessary to describe here the precautions which were necessary in conducting this process; it is sufficient to say, that those who have adopted this process, have found many practical difficulties, and not the least frequent has been the fracture of some of the vessels employed.

This process, notwithstanding its difficulties, being the only one employed in our laboratories, the practice has be-

come almost universal, in France, of employing this finely-divided calomel. It must be admitted, nevertheless, that in whiteness and fineness of division, the calomel prepared in France would not bear comparison with that imported from England.

In order to improve the product, and render the operation more easy, I proposed to substitute a current of air instead of steam, to effect the minute division of the calomel.

The apparatus consisted of an earthen tube placed across a furnace, in which the calomel in small lumps is heated. A current of air is passed continually through the tube by means of a centrifugal blowing-apparatus, so as to carry the vapour as it is formed into a receiver. If no obstacle be offered to the current, the calomel is in so fine a state of division, that it would be carried to a great distance; to obviate this, I found the best plan was, to make the tube terminate in a chamber divided into three stories by shelves running nearly across, and the communication from one to the other being at opposite sides of the chamber. The calomel was made to enter at the bottom of the chamber, while a pipe from the top, terminating in a vessel containing water, allowed the air to escape. This plan answered very well.

Numerous experiments, however, have induced me to relinquish this process in favor of another more simple, and in every respect satisfactory.

I now employ neither steam nor a current of air: my apparatus is composed simply of a tube and a receiver; and I obtain the calomel, in the finest state of division and of beautiful appearance, by a single operation. The principle of this operation is similar to that of the process for the manufacture of flowers of sulphur.

The vessels in which I heat the calomel are earthen tubes, about four inches in diameter and eighteen inches long. These are closed at one end and open at the other, and each

tube contains from ten to fourteen pounds troy of calomel. The tubes which I use have been made with the clay employed in the manufacture of Paris crucibles. I have gone to the pains of having them coated on the outside with a layer of another kind of clay. By this means they so far resist the action of the fire as to admit of being used several times.

The tube containing the calomel is placed in a furnace, the form of which is adapted to it, the open extremity of the tube protruding through an aperture made for that purpose, and communicating with a receiver. The receiver which I have hitherto employed is a large stone vase, with a hole pierced in the side to receive the open end of the tube. A small opening at the top, over which a plate of glass is laid, serves to allow of the escape of the diluted air.

Instead of this vessel, a small chamber may be built of brick-work attached to the furnace; but for operating on a few pounds, I prefer to use the vessel I have described.

The receiver ought to be placed as near as possible to the furnace, to prevent the calomel from condensing in the end of the tube. On the other hand, the receiver should be protected from the heat of the furnace: to effect this, the opening, at which the tube issues from the furnace, should be luted with clay, and two polished plates of metal should be placed between the furnace and the receiver to prevent the radiation of heat. Thus are accomplished the two conditions essential to success; the tube is heated to within a very short distance of its entrance into the receiver, by which means the calomel is prevented from condensing in the tube; and the receiver is preserved from the heat of the furnace, which, by raising the temperature of the air too high, would cause the calomel to be deposited in crystallized agglomerations instead of a finely-divided powder.

Nothing is more simple than the management of the fire.

The tube is heated to dull redness at that part nearest to the receiver, then the fire is extended by degrees along its whole length. An hour and a half or two hours is sufficient to complete the sublimation of twelve or fourteen pounds of calomel.

When the operation is considered to be finished, the apparatus is unluted, and the calomel is washed with distilled water until the water ceases to be colored by sulphuretted hydrogen. The calomel is afterwards dried by a very gentle heat.

Such is the very simple method of operating to which I have arrived, and I feel confident it is that which is kept secret by the manufacturers in England, for the calomel produced will bear comparison with the very best that is imported from that country. This is a triumph acquired to our commerce.

I am now occupied in applying this process to the division of other volatile mineral substances, and have already effected its application to some. The operation presents difficulties in the cases of orpiment and cinnabar, arising from these substances requiring the contact of air at a high temperature.

Pharm. Journ., from Journal de Pharmacie.

ART. XX.—ON THE PREPARATION OF ENGLISH CALOMEL.

BY M. CALVERT.

THE importance of being able to manufacture, in France, a calomel as good and as cheap as that which is imported from England, renders it a matter of interest to know the exact process adopted by the London manufacturers. It must be observed, however, that the following details are merely given as a supplement to the very ingenious paper on the preparation of calomel, by M. Soubeiran. This Chemist has in fact discovered the basis of the English process, his method of operating differing only in the nature of the apparatus employed. The material principle is the same in both cases, namely, the employment of a chamber into which the vapour of the calomel is conducted, sufficiently large for the air contained in it to hold the particles of calomel in suspension during the condensation of the vapour, and thus to prevent its crystallization.

The apparatus employed in England consists of an iron cylinder about thirty inches long and twelve inches diameter, closed at one end by a kind of door in the same way as the cylinders employed in the manufacture of hydrochloric acid. It is at this end that the materials used in making the calomel are introduced. The other end of the cylinder has a neck or contraction, six inches long and six inches in diameter. This neck is made large, so that it may not get stopped up by the condensation of the calomel. The neck of the cylinder penetrates the side of a bricked chamber, lined on the inside with flag-stones. This chamber is about six feet six inches high, and four feet six inches wide; the bottom is a little sloped, and in one of the sides is a door

for removing the product of each operation. Lastly, the cylinder is set in a furnace in such a manner that the flame entirely envelopes it.

The calomel is introduced into the cylinder, and a small quantity of corrosive sublimate is added, to supply chlorine to a portion of mercury, which appears to result from the partial reduction of the protochloride. But it is found that this decomposition may be almost entirely prevented, if, instead of using calomel, the substances from which it is produced be employed, mixed in the proper proportions. The calomel thus obtained is so pure, that it merely requires to be once washed.

I could not believe for some time that an iron cylinder could be used, for it appeared to me that this metal would cause a decomposition of the protochloride of mercury, the iron being converted into perchloride with the chlorine of a part of the calomel, and this would be volatilized with the remaining calomel and the mercury, thus injuring the beauty and purity of the product; but on further reflection it appears that this change could hardly take place at a temperature so high as that which is necessary for working an apparatus containing many pounds of the materials for producing calomel.—*Ibid.*

ART. XX.—ON GRAINS OF PARADISE.

BY JONATHAN PEREIRA, M.D., F.R.S. & L.S.

In a preceding paper* I have shown, that in the east the name of Grain of Paradise is applied to the Ceylon cardamom; and, thinking it probable that other scitamineous fruits may have probably borne the same name, I have been led to make some investigations on the subject, the results of which are subjoined.

I endeavored, in the first instance, to ascertain what circumstances led to the application of the name "Grain of Paradise," to the fruit or seeds of a scitamineous plant, but have not found authors agreed on this point. Marmot, quoted by Barbot,† says, "that before the coming of the Portuguese to this coast of Malaguette, the merchants of Barbary repaired thither to fetch off this pepper [Malaguetta pepper;] traversing the whole kingdom of Mandinga in Nigritia, and the country commonly called Guinea, *i. e.*, Genehoa and the Lybian Deserts; and from Barbary some quantity of that spice was transported into Italy, where it was called Grains of Paradise, because its origin was unknown there." But Valentini‡ says, that the seeds, "vel propter pulchritudinem, aut odorem valde gratum, quem recentia spargunt, grana Paradisi vocata."

I find that the term, Grains of Paradise, has been applied to the produce of no less than six scitamineous plants; and there is a seventh fruit which may have at times, perhaps, borne the same name.

1. The *Melligetta*, *Grana Paradisi*, or *Cardamomum*

* Pharmaceutical Transactions, vol. ii., p. 384.

† Churchill's Collection of Voyages and Travels, vol. v., p. 138. Lond. 1732.

‡ Historia Simplicium reformata. Francof. 1716.

piperatum of Valerius Cordus,* appears to be identical with the hot acrid seeds now known as Grains of Paradise, and which were exclusively brought from Guinea, whence their name of *Guinea grains*. They are the produce of *Amomum Grana Paradisi*, Smith.† Cordus states, that the fruit resembles an egg in shape and size, and that the seeds have a hot flavor like that of pepper and ginger. These characters leave no doubt as to the identity of his Melligetta with our Grains of Paradise.

2. The *Cardamomum majus* of Cordus has been confounded by many writers with his Melligetta. He appears to have been well aware of the error, for he observes, "Errant quotque dicunt, Melligettam, majus Cardamomum esse. Cardamomis enim tenuis minimeque fervens sed gratus ac jucundus est sapor, Melligettæ vero piperis instar acerrimus." This cardamom is the produce of *Amomum angustifolium*, Sonnerat‡ and Smith,§ the *A. madagascariense* of Lamarck.|| It can scarcely be doubted, therefore, that Linnæus¶ and other botanists, who give Madagascar as one of the habitats of the Grain of Paradise plant, have confounded the Guinea plant (*Amomum Grana paradisi*, Smith) with that of Madagascar (*A. angustifolium*, Sonnerat;) for the Grains of Paradise of commerce are always brought from Guinea. Some very fine samples of the Madagascar cardamom (*Cardamomum majus*, Cordus,) are contained in Dr. Burgess's collection of Materia Medica at the College of Physicians. One of these I have figured in my "*Elements of Materia Medica*," vol. ii., under the

* Historia Stirpium, lib. iv., p. 195. 1561.

† Rees' Cyclopædia, vol. xxiii., art. *Mellegettä;* also vol. xxxix., art. *Amomum*. Roscoe (*Monandrian Plants*,) declares, that his *Amomum Melegueta*, which he considers to be a distinct species, yields the Melegueta pepper of the shops.

‡ Voyage aux Indes, t. ii., p. 242.

§ Rees' Cyclopædia, vol. xxxix., art. *Amomum*.

|| Encyclopédie Methodique, div. *Botanique*.

¶ Species Plantarum. Holmiæ. 1753.

name of the *Madagascar cardamom.* I have recently received specimens of this fruit under the name of *Cardamoms from Abyssinia,* from Professor Royle. The seeds have an agreeable aromatic flavor, and are totally devoid of that excessively hot acrid taste which is so characteristic of the Melligetta pepper, or Grains of Paradise brought from Guinea.

3. Gærtner* has figured the fruit and seeds of a scitamineous plant under the name of *Zingiber Melægueta,* and which he considered to be identical with the Grains of Paradise. The seeds, however, are readily distinguished from the real Grains of Paradise by their leaden color, and their slightly aromatic flavor. Several capsules, in very good preservation, are contained in the Sloanian collection of fruits in the British Museum. According to Sir James Edward Smith,† the plant which yields them is a native of Sierra Leone, and is called by the natives *maboobo.* He terms it *Amomum macrospermum,* or the *large-seeded Guinea amomum.*

4. There is occasionally imported into this country a scitamineous fruit known by the name of the *Java cardamom.* It is the *Cardamome fausse maniguette* of Guibourt.‡ My friend, Dr. Royle, informs me that at Saharunpore it is called *Bura Elachee,* or *great cardamom,* while in the Calcutta market it is known as the *Bengal cardamom.* Ainslie§ calls its seeds *greater seeds of cardamoms,* and gives as synonymes *Burrie Eelatchy,* and *Desi Elachi* (*country cardamoms.*) The former of these terms agrees with that assigned to these fruits by my friend, Dr. Royle. Ainslie appears to consider these seeds as identical with Grains of Paradise, and accordingly refers them to the

* De fructibus et seminibus plantarum.

† Rees' Cyclopædia, vol. xxxix.

‡ Hist. des Drogues.

§ Materia Indica, vol. i. p. 54, 5.

Amomum Granum Paradisi. But I have elsewhere* shown it to be the produce of *Amomum maximum*, Roxburgh, a native of Java,† and which is cultivated at Nepal.‡ Hence the fruit is sometimes called *Java cardamoms*, or *Nepal cardamoms*. I have recently received from my former pupil, Mr. Thomas Brydon, now of the firm of Bruce & Co., of Madras, five samples of this same fruit, procured from a dealer. They varied somewhat in size, and bore the following names supplied by the native dealer:

1. "*Large sized cardamoms.—Not known where from.—Used as Medicine.*"
2. "*Segoor Jungle cardamoms.—Medicinal.*"
3. "*Cardamoms collected on the Malabar Coast.—Medicinal.*"
4. "*Round Cochin cardamoms.—Medicinal.*"
5. "*Odd or spare cardamoms.—Not known.—Used as Medicine.*"

If the capsule be soaked in hot water, from nine to thirteen membranous wings become apparent, and which distinguish this from every other kind of cardamom which I have hitherto met with in commerce. The seeds are feebly aromatic.

5. I have already shown§ that *Ceylon cardamoms* (*Elettaria major*, Smith) have been confounded with Grains of Paradise (*Amomum Granum Paradisi*, Smith.) The substitution of the one for the other was known to Dale,‖ who observes of the Ceylon cardamoms, that "rarius in nostris officinis inveniuntur; alii enim Grana Paradisi officinis dicta seu Meleguetam, non sine errore, alii Amomum verum *Ger.* horum loco substituunt." And Lewis,¶ in

* Elements of Materia Medica, vol. ii., p. 1028. 2d edit.

† Blume, *Enum. Plant. Javæ.*

‡ Hamilton (Buchanan,) Account of the Kingdom of Nepal.

§ Pharmaceutical Transactions, vol. ii., p. 384.

‖ Pharmacologia, p. 252. 3tia ed. 1737.

¶ An Experimental History of the Materia Medica, p. 177. London. 1761.

speaking of the Ceylon cardamom, which he calls "*Cardamomum medium*," observes, that "there is some confusion in regard to the name; that of *Cardamomum majus* being applied among us to this species, and in France to the *Grana paradisi*."

6. Burmann* refers Grains of Paradise to his "Cardamomum Zeylanicum fructu rotundo nigro," and which I presume is the *Alpinia Allughas* of Roscoe. But the greatest confusion exists in Burmann's work, with regard to the synonymes of cardamoms and grains of paradise. He confounds no less than five or six distinct fruits with his round black Ceylon cardamom.

7. The last scitamineous fruit which I have to notice is a very rare one, and I shall distinguish it by the name of *Clusius's cardamom*, because I believe it to have been first described by Clusius,† who observes, that although it has some resemblance to Melegueta, yet if the two fruits be carefully compared the difference is very obvious; and he then proceeds to point out the distinctions between them. Its origin was unknown; it was collected by an apothecary, who died on his voyage, without leaving any memorandum respecting it. More than two hundred years afterwards a second specimen of the same fruit was accidentally found in a druggist's shop, by Sir James Edward Smith,‡ who has described it under the name of *Amomum Clusii*. He thinks it was met with in a chest of great cardamoms (Madagascar cardamoms.) A third specimen was given me by a druggist a few years since.§ These are all the known specimens which have been met with. The capsule might be confounded by superficial observers with either Mellegetta or the Madagascar cardamom; but the seeds at once

* Thesaurus Zeylanicus, p. 54.

† Exoticorum, lib. ii., cap. xv. 1605.

‡ Rees' Cyclopædia, vol. xxxix.

§ Lucae, of Berlin, to whom I showed this fruit, told me he had before met with a specimen under the name of *Melaleuca Cajaputi*.

distinguish it. They are totally devoid of the acrid hot taste of the Mellegetta; are not at all angular, but oblong or ovate, slightly inclining to cylindrical, and are so highly polished that they appear as if varnished.

These seven scitamineous fruits thus briefly noticed, are, as far as I have been able to ascertain, the only ones to which the name of *Mellegetta*, or *Grain of Paradise* has been applied. At the present day, in England, this name is used to indicate the hot acrid seeds brought from the coast of Guinea (hence called *Guinea Grains*) and produced by the *Amomum Granum Paradisi* of Sir J. E. Smith. A very erroneous notion has long prevailed that they are poisonous; and, as they are employed principally to give a pungent flavor to spirituous liquors, &c., the very heavy duty of two shillings per pound was imposed on them, and which was intended to act as a prohibition to their use. I see, however, that by the new tariff, introduced by Sir Robert Peel, the duty is lowered to fifteen shillings per cwt.

Pharm. Journ. and Transactions.

ART. XX.—AN EFFORT TO REFUTE THE ARGUMENTS ADVANCED IN FAVOR OF THE EXISTENCE, IN THE AMPHIDE SALTS,* OF RADICALS, CONSISTING, LIKE CYANOGEN, OF MORE THAN ONE ELEMENT.

BY ROBERT HARE, M.D.

Professor of Chemistry in the University of Pennsylvania.

The following is a Summary of the Opinions which it is the Object of the subsequent Reasoning to Justify.

(*a*) The community of effect, as respects the extrication of hydrogen by contact of certain metals with aqueous solutions of sulphuric and chlorohydric acid, is not an adequate ground for an inferred analogy of composition, since it must inevitably arise that any radical will, from any compound, displace any other radical, when the forces favoring its substitution preponderate over the quiescent affinities.

(*b*) But if, nevertheless, it be held that the evolution of hydrogen from any combination, by contact with a metal, is a sufficient proof of the existence of a halogen† body, simple or compound, in the combination, the evolution of hydrogen from water, by the contact with any metal of the alkalies, must prove oxygen to be a halogen body; also the evolution of hydrogen from sulphydric, selenhydric, or telluhydric acids, by similar means, would justify an inference

* An amphide salt is one consisting of an acid and a base, each containing an amphigen body, either oxygen, sulphur, selenium, or tellurium, as its electro-negative ingredient.

† The epithet halogen is applied to bodies whose binary compounds with metals are deemed salts, and which are consequently called haloid salts.

that sulphur, selenium, or tellurium, as well as oxygen, belong to the halogen or salt radical class:—

(*c*) The amphigen bodies being thus proved to belong to the halogen class, oxides, sulphides, selenides, and tellurides, would be haloid salts, and their compounds double salts, instead of consisting of a compound radical and a metal:—

(*d*) The argument in favor of similarity of composition in the haloid and amphide salts, founded on a limited resemblance of properties in some instances, is more than counterbalanced by an extreme dissimilitude in many others:—

(*e*) As, in either class, almost every property may be found which is observed in any chemical compound, the existence of a similitude, in some cases, might be naturally expected:—

(*f*) As it is evident that many salts, perfectly analogous in composition, are extremely dissimilar in properties, it is not reasonable to consider resemblance in properties, as a proof of analogy in composition:—

(*g*) No line of distinction, as respects either properties or composition, can be drawn between the binary compounds of the amphigen and halogen bodies, which justifies that separate classification which the doctrine requires; so that it must be untenable as respects the one, or be extended to the other:—

(*h*) The great diversity, both as respects properties and composition of the bodies called salts, rendering it impossible to define the meaning of the word, any attempt to vary the language and theory of Chemistry, in reference to the idea of a salt, must be injudicious:—

(*i*) There is at least as much mystery in the fact, that the addition of an atom of oxygen to an oxacid, should confer an affinity for a simple radical, as that the addition of an atom of oxygen to such a radical, should create an affinity between it and an oxacid:—

(*j*) If one atom of oxygen confer upon the base into which it enters, the power to combine with one atom of acid, it is quite consistent that the affinity thus conferred should be augmented, proportionably, by a further accession of oxygen:—

(*k*) It were quite as anomalous, mysterious, and improbable, that there should be three oxyphosphions, severally requiring for saturation one, two, and three atoms of hydrogen, as that three isomeric states of phosphoric acid should exist, requiring as many different equivalents of basic water:—*

(*l*) The attributes of acidity alleged to be due altogether to the presence of basic water, are not seen in hydrated acids, when holding water in that form only; nor in such as are, like the oily acids, incapable of uniting with water as a solvent. Further, these attributes are admitted to belong to salts which, not holding water as a base, cannot be hydrurets or hydracids of any salt radical: and while such attributes are found in compounds which, like chromic, or carbonic acid, cannot be considered as hydrurets, they do not exist in all that merit this appellation, as is evident in the cases of prussic acid, or oil of bitter almonds:—

(*m*) It seems to have escaped attention, that if SO^4 be the oxysulphion of sulphates, SO^3, anhydrous sulphuric acid, must be the oxysulphion of the sulphites; and that there must, in the hyposulphites and hyposulphates, be two other oxysulphions!—

(*n*) The electrolytic experiments of Daniell have been erroneously interpreted, since the electrolysis of the base of sulphate of soda would so cause the separation of sodium and oxygen, that the oxygen would be attracted to the anode, the hydrogen and soda being *indirectly* evolved by the reaction of sodium with water; while the acid, deprived of its alkaline base, would be found at the anode in combi-

* See Kane's Chemistry.

nation with basic water, without having been made to act in the capacity of an anion.

(*o*) The copper in the case of a solution of the sulphate of this metal and a solution of potash, separated by a membrane, would, by electrolyzation, be evolved by the same process as sodium, so long as there should be copper to perform the office of a cathion; and when there should no longer be any copper to act in this capacity, the metal of the alkali, or hydrogen of water, on the other side of the membrane, would act as a cathion; the oxygen acting as an anion from one electrode to the other, first to the copper, and then to the potassium:—

(*p*) The allegation that the copper was deposited from the want of an anion (oxysulphion) to combine with, is manifestly an error, since, had there been no anion, there could have been no discharge, as alleged, to hydrogen as a cathion, nor any electrolysis:—

(*q*) The hydrated oxide precipitated on the membrane came from the reaction of the alkali with the sulphate of copper; the precipitated oxide of this metal from the oxygen of the soda acting as an anion; and the deposit of metallic copper from the solutions performing, feebly, the part of electrodes, while themselves the subjects of electrolyzation:—

(*r*) The so called principles of Liebig,* by which his theory of organic acids is preceded, are mainly an inversion of the truth, since they make the capacity of saturation of hydrated acids dependent on the quantity of hydrogen in their basic water, instead of making both the quantity of water, and, of course, the quantity of hydrogen therein, depend on their capacity:—

(*s*) All that is truly said of hydrogen would be equally true of any other radical, while the language employed

* Traité de Chymie Organique, tom. 1, page 7.

would lead the student to suppose that there is a peculiar association between capacity of saturation, and presence of hydrogen.

AN EFFORT, &c. &c.

1. Some of the most distinguished European chemists, encouraged by the number of instances in which the existence of hypothetical radicals has been rendered probable, have lately inferred that such radicals are essential to the constitution of a most important class of bodies heretofore considered as compounds of acids and bases. It has been inferred, for instance, that sulphur, with four atoms of oxygen, (SO^4) constitutes a compound radical, which is analogous in habitudes and composition to cyanogen, performing in hydrous sulphuric acid, the same part as chlorine in chlorohydric acid.

2. Graham has proposed sulphatoxygen as a name for this radical, and sulphatoxide for any of its compounds. Daniell has proposed oxysulphion and oxysulphionide for the same purposes. As either nomenclature is evidently liable to the same objections, it will be sufficient to cite the terms suggested by one of these authors in reasoning against their adoption.

3. Consistently with the language suggested by Daniell, hydrous sulphuric acid, constituted of one atom of acid and one of basic water, (SO^3+HO) is a compound of oxysulphion and hydrogen (SO^4+H.) Nitric acid (NO^5+HO) is a compound of oxynitrion and hydrogen (NO^6+H.) In like manner we should have oxyphosphion in phosphoric acid, oxyarsenion in arsenic acid, and in all acids, hitherto called hydrated, whether organic or inorganic, we should have radicals designated by names made after the same plan. Their salts having corresponding appellations, would

be oxysulphionide, oxynitrionides, &c. Also, in any salts in which any other of the amphigen class of Berzelius is the electro-negative ingredient, whether sulphur, selenium, or tellurium, all the ingredients excepting the electro-positive radical, would be considered as constituting a compound electro-negative radical.*

4. It may be expedient to take this opportunity of mentioning, that the advocates of this new view, disadvantageously as I think, employ the word radical, to designate the electro-negative, as well as the electro-positive ingre-

* The conception of the existence of salt radicals seems to have originated with Davy. It was suggested by Berzelius, in his letter in reply to some strictures which I published on his Nomenclature, in the following language:—

"If, for instance, the true electro-chemical composition of the sulphate of potash should not be $KO+SO^3$, as is generally supposed, but $K+SO^4$, and it appears very natural that atoms, so eminently electro-negative as sulphur and oxygen, should be associated, we have, in the salt in question, potassium combined with a compound body, which, like cyanogen in $K+C^2N$, imitates simple halogen bodies, and gives a salt with potassium and other metals. The hydrated oxacids, agreeably to this view, would be then hydracids of a compound halogen body, from which metals may displace hydrogen, as in the hydracids of simple halogen bodies. Thus we know that SO^3, that is to say, anhydrous sulphuric acid, is a body, whose properties, as respects acidity, differ from those which we should expect in the active principle of hydrous sulphuric acid.

"The difference between the oxysalts and the halosalts is very easily illustrated by formulæ. In KFF (fluoride of potassium,) there is but one single line of substitution, that is to say, that of K|FF; whilst in KOOOOS (sulphate of potash) there are two, K|OOOOS and KO|OOOS, of which we use the first in replacing one metal by another, for instance, copper by iron; and the second in replacing one oxide by another.

"I do not know what value you may attach to this development of the constitution of the oxysalts (which applies equally to the sulphosalts and others;) but as to myself, I have a thorough conviction that there is therein something more than a vague speculation, since it unfolds to us an internal analogy in phenomena, which, agreeably to the perception of our senses, are extremely analogous."

dient. Agreeably to the nomenclature of Berzelius, the former would be a compound halogen body. Cyanogen, being analogous, is by him placed in the halogen class. I shall, therefore, in speaking of "*salt radicals*," improperly so called, employ the appellation contrived by the great Swedish chemist.

5. It seems to be conceded, that however plausible may be the reasons for inferring the existence of halogen bodies in the amphide salts, it would be inexpedient to make a corresponding change in nomenclature, on account of the great inconvenience which must arise from the consequent change of names. Under these circumstances, it may be well to consider how far there is any necessity for adopting hypothetical views, to which it would be so disadvantageous to accommodate the received language of chemists. In the strictures on the Berzelian nomenclature, which drew from Berzelius the suggestions contained in the quotation at the foot of the preceding page, I stated it to be my impression that water should be considered as acting in some cases as an oxybase, in others as an oxacid; and, in my examination of his reply,* I observed that *hydrous sulphuric acid might be considered as a sulphate of hydrogen, and that when this acid reacts with zinc or iron, the proneness of hydrogen to the aëriform state enables either metal to take its place, agreeably to the established laws of affinity.*

6. There appears to have been a coincidence of opinion between Kane, Graham, Gregory, and myself, as respects the electro-positive relation of hydrogen to the amphigen and halogen elements, which I have designated collectively as the basacigen class; also in the impression that hydrogen acts like a metallic radical, its oxide, water, performing the part of a base. I agree perfectly with Gregory in considering that hydrated acids may be considered as "*hydrogen*

*Silliman's Journal, Vol. 27, for 1835, page 61.

salts." But when the learned editor proceeds to allege that "*acids and salts, as respects their constitution, will form one class,*" I consider him, and those who sanction this allegation, as founding an error upon an oversight. Because the salts of hydrogen, or such as have water for their base, have heretofore been erroneously called acids, we are henceforth to confound salts with acids, and, instead of correcting one wrong name, cause all others to conform thereto!

7. I fully concur with Gregory and Kane, in considering that water in hydrous sulphuric acid, in nitric acid, chloric acid, and in organic acids, generally acts as a base; also, that in this basic water hydrogen performs a part perfectly analogous to that of a metallic radical; but, agreeably to this view, I cannot perceive any difficulty in accounting for the evolution of hydrogen, as suggested in the quotation above made (6,) agreeably to which, when diluted sulphuric acid reacts with zinc or iron, the liberation of hydrogen results from the superiority of the forces which tend to insert either of these metals in the place occupied by the hydrogen, over those which tend to retain it in statu quo.

8. When oxide of copper is presented to chlorohydric acid, it is inferred that the hydrogen unites with oxygen, and the chlorine with the metal; and hence it seems to be presumed, that when oxide of copper is combined with sulphuric acid, a similar play of affinities should ensue: but would it be reasonable to make this a ground for assuming the existence of a compound radical, when the phenomena admit of another explanation quite as simple and consistent with the laws of chemical affinity?

9. Whether hydrogen be replaced by zinc, or oxide of hydrogen by oxide of copper, cannot make any material difference. In the one case, a radical expels another radical, and takes its place; in the other, a base expels another base, and takes its place.

10. There can be no difficulty, then, in understanding

wherefore, from the compound of sulphur and three atoms of oxygen, and an atom of basic water, hydrogen should be expelled and replaced by zinc, or that water should be expelled and replaced by oxide of copper; the only mystery is in the fact, that SO^3, as anhydrous sulphuric acid, will not combine with hydrogen, copper, or any other radical, unless oxydized. But this mystery equally exists on assuming that an additional atom of oxygen converts SO^3 into oxysulphion, endowed with an energetic affinity for metallic radicals, to which SO^3 is quite indifferent.

11. In either case an inexplicable mystery exists; but it is, in the one case, associated with an hypothetical change, in the other, with one which is known to take place.

12. But if hydrous sulphuric acid is to be assumed to be a hydruret of a compound halogen body (*oxysulphion*,) because it evolves hydrogen on contact with zinc, wherefore is not water, which evolves hydrogen on contact with potassium, sodium, barium, strontium, or calcium, to be considered as a hydruret of oxygen, making oxygen a halogen body?

13. Boldly begging the question, Graham reasons thus: "*the chlorides themselves being salts, their compounds must be double salts.*"

14. But if the chlorides are salts, the chloride of hydrogen is a salt; and if so, wherefore is not the oxide of hydrogen a salt, which, in its susceptibility of the crystalline form, has a salt attribute which the aëriform chloride does not possess?

15. Further, if the oxide of hydrogen be a salt, every oxide is a salt, as well as every chloride. Now, controverting the argument above quoted, by analogous reasoning, it may be said, "*the oxides themselves being salts, their compounds are double salts.*" Of course sulphate of potash is not a sulphatoxide, as Graham's ingenious nomenclature would make it, but must be a double salt, since it consists of two oxides in "themselves salts."

16. I trust that sufficient reasons have been adduced, to make it evident that the common result of the extrication of hydrogen, during the reaction of zinc or iron with sulphuric or chlorohydric acid, is not a competent ground for assuming that there are, in amphide salts, "compound radicals" playing the same part as halogen bodies.

17. Let us, in the next place, consider the argument in favor of the existence of such radicals, founded on the similitude of the haloid and amphide salts, which is stated by Dr. Kane in the following words:—

"It had long been remarked as curious, that bodies so different in composition as the compound of chlorine with a metal, on one hand, and of an oxygen acid with the oxide of the metal on the other, should be so similar in properties that both must be classed as salts, and should give rise to a series of basic and acid compounds for the most part completely parallel."—*Elements, p.* 681.

18. Upon the *similitude* and *complete parallelism* of the amphide and haloid salts, thus erroneously alleged, the author proceeds to argue in favor of the existence in the former, of compound halogen bodies, analogous in their mode of combination to chlorine or iodine.

19. I presume it will be granted, that if similitude in properties be a sufficient ground for inferring an analogy in composition, dissimilitude ought to justify an opposite inference. And that if, as the author alleges, certain bodies have been classed as salts, on account of their similarity in this respect, when dissimilar they ought not to be so classed. Under this view of the question, I propose to examine how far any similitude in properties exists between the bodies designated as salts by the author or any other chemist.

20. The salts, hitherto considered as compounds of acids and bases, are by Berzelius called amphide salts, being produced severally by the union of one or other of his amphigen class, comprising oxygen, sulphur, selenium, and tellurium, with two radicals, with one of which an acid is

formed, with the other a base. The binary compounds of his halogen class, comprising chlorine, bromine, iodine, fluorine and cyanogen, are called by him haloid salts. I shall use the names thus suggested.

21. Among the haloid salts we have common salt and Derbyshire spar; the gaseous fluorides and chlorides of hydrogen, silicon or boron; the fuming liquor of Libavius; the acrid butyraceous chlorides of zinc, bismuth and antimony; the volatile chlorides of magnesium, iron, chromium, and mercury, and the fixed chlorides of calcium, barium, strontium, silver and lead; the volatile poison prussic acid, and solid poisonous bicyanide of mercury, with various inert cyanides like those of Prussian blue: likewise a great number of etherial compounds.

22. Among the amphide salts are the very soluble sulphates of zinc, iron, copper, soda, magnesia, &c., and the insoluble stony sulphates of baryta and strontia; also ceruse and sugar of lead; alabaster, marble, soaps, ethers, and innumerable stony silicates, and aluminates. Last, but not among the least discordant, are the hydrated acids and alkaline and earthy hydrates.

23. When the various sets of bodies, above enumerated as comprised in the two classes under consideration, are contemplated, is it not evident that, not only between several sets of haloid and amphide salts, but also between several sets in either class, there is an extreme discordancy in properties: so that making properties the test would involve not only that various sets in one class could not be coupled with certain sets in the other, but, also, that in neither class could any one set be selected as exemplifying the characteristics of a salt, without depriving a majority of those similarly constituted, of all pretensions to the saline character?

24. Now, if among the bodies above enumerated, some pairs of amphide and haloid salts can be selected, which make a tolerable match with respect to their properties, as

in the case of sulphate of soda, and chloride of sodium, while in other cases there is the greatest discordancy, (as in the stony silicate felspar, and the gaseous fluoride fluosilicic acid gas; as in soap and Derbyshire spar; as in marble and the fuming liquor of Libavius, the sour protochloride of tin, and sweet acetate of lead,) is it reasonable to found an argument in favor of a hypothetical similitude in composition, on the *resemblance* of the two classes in properties? Does not the *extreme* dissimilitude in some cases, more than countervail the limited resemblance in others? And when the great variety of properties displayed both by the amphide and haloid salts is considered, is it a cause for wonder or perplexity, that in some instances, amphide salts should be found to resemble those of the other kind?

25. Again, admitting that there was any cause for perplexity agreeably to the old doctrine, is there less, agreeably to that which is now recommended? Is there no ground for wonder that oxygen or sulphur cannot act as simple halogen bodies? By what rule are their binary compounds to be excluded from the class of haloid salts? Wherefore should chlorides, bromides, iodides, and fluorides, however antisaline in their properties, be considered as salts, while in no case is an oxide, a sulphide, selenide or telluride to be deemed worthy of that name?

26. I challenge any chemist to assign any good reason wherefore the red iodide of mercury is any more a salt than the red oxide, or the protochloride is more saline than the sulphide: or why the volatile oxides of osmium or of arsenic are less saline than horn silver or horn lead; or the volatile chloride of arsenic, than the comparatively fixed sulphides of the same metal: why gaseous chlorohydric acid is more saline than steam or gaseous oxhydric acid, as aqueous vapor may be designated without any inconsistency.

27. It much surprises me, that when so much stress is laid upon the idea of a salt, the impossibility of defining the meaning of the word escapes attention. How is a salt to be

distinguished from any other binary compound? When the discordant group of substances which have been enumerated under this name is contemplated, is it not evident that no definition of them can be founded on community of properties; and by the advocates of the new doctrine, composition has been made the object of definition, instead of being the basis; thus, agreeably to them, a compound is not a salt, because it is made of certain elements; but, on the contrary, an element, whether simple or compound, belongs to the class of salt radicals, because it produces a salt. Since sulphur, with four atoms of oxygen, SO^4, produces a salt with a metal, it must be deemed a salt radical.

28. In proof that the double chlorides are not united in a way to justify the opinion adopted by Bonsdorff, Thomson, myself, and others, it is alleged by Graham, "*that in such compounds the characters of the constituent salts are very little affected by their state of union.*"

29. This allegation being, in the next page, admitted to be inapplicable in the case of the double cyanides; an effort is made to get over this obstacle, by suggesting the existence of another compound radical. But the allegation of the author is erroneous as respects various double haloid salts, especially the fluosilicates, the fluoborates, fluozirconiates, the chloroplatinates, chloroiridiates, chloroosmiates, chloropalladiates, &c., all of them compounds in which the constituent fluorides and chlorides exist in a state of energetic combination by which they are materially altered as to their state of existence.

30. Evidently the word salt has been so used, or rather so abused, that it is impossible to define it, either by a resort to properties or composition; and I conceive, therefore, that to make it a ground of abandoning terms which are susceptible of definition, and which have long been tacitly used by chemists in general, in obedience to such definition, would be "*a retrograde movement in the science.*" I hope Dr. Kane will pardon me for employing the language

to which he has resorted, in speaking of the opinions of Bonsdorff.

31. If this doctrine, as it has been stated, is to prevail, I do not perceive how it is to be prevented from claiming an inconvenient extension. The hydrates, as well as the sulphates, must have pretensions to contain salt radicals. Hence in the hydrated alkalies and alkaline earths, there would be a compound radical, consisting of hydrogen, with two atoms of oxygen, hydroxion, and these compounds would be hydroxionides; nor can I conceive that the haloid compounds, erroneously called double salts, but more correctly considered as single salts, can be exempted.

32. Between the reaction of fluoboric acid with fluobases, and sulphuric acid with oxybases, is there not a great resemblance?

33. I am unable to understand how, if the existence of salt radicals in oxysalts is inferred, the other salts of the amphigen class can be exempted from a corresponding inference. But if the existence of salt radicals in the double sulphides be admitted, can it be consistently denied that they exist also in double chlorides, iodides, &c.? Is there not the greatest analogy between the habitudes of sulphur, selenium, and tellurium, with metals, and those of the halogen bodies, so called?

34. Would not the modification of the etherial oxysalts, to comport with the new hypothesis, be disadvantageous, both as respects our mental conception of those compounds, and the names which would be rendered appropriate? Would not the transfer of the oxygen from the etherial oxide to the acid, and the creation, thus, of new salt radicals for the organic acid salts, be objectionable; such as oxyoxalion for oxalates, oxytartarion for tartrates, oxyacetion for acetates; while, for their compounds, we should have oxyoxalionides, oxytartarionides, oxyacetionides, &c.?

35. If sulphates are to be considered as oxysulphionides, by what names are we to designate the sulphites, hyposul-

phites, and hyposulphates, SO^2, S^2O^3, S^2O^5? SO^3 may, perhaps, with more propriety be considered as consisting of a compound radical, SO^2, and oxygen, forming an oxide of sulphurous acid; but in a sulphite, anhydrous sulphuric acid, SO^3 becomes a species of oxysulphion itself, being as much the oxysulphion of the sulphites, as SO^4 is of the sulphates. Of course SO^3 should have a direct affinity for radicals, contrary to fact. I presume that sulphites would have to be trioxysulphionides; hyposulphites, sesquioxysulphionides; sulphates, quadroxysulphionides; while the hyposulphates would, I suppose, be demiquintoxysulphionides!!!

36. Analogous complication in nomenclature would arise in respect to the nitrites and nitrates, phosphites and phosphates, arsenites and arseniates; also as respects the carbonic and oxalic acids.

37. It is true that nature has not so made her bodies as that they can be separated into classes, between which any distinct line can be drawn: still it has been found advantageous to classify them to the best of our power. Accordingly it appears to me expedient, in the first place, to distinguish elements (or those compounds which act like them) according to their electro-chemical relations to each other, or their habitudes with the voltaic electrodes. Consistently, chemists have tacitly adopted the plan of treating the compounds formed by electro-negative elements with anions, as acids; those formed with cathions, as bases; while the combinations formed by the union of such acids and bases have been considered as simple salts. Thus four classes are constituted, consisting of electro-negative elements, of acids, bases, and single salts, while, by the union of the latter, a fifth class of double salts is formed. Whether the words acid, base, and salt, be adhered to, objectionable as they are in some respects, and especially the latter, or some others be contrived, it would seem to me disadvantageous to merge them in one name, pursuant to the views of the advocates of

salt radicals, as stated by Gregory in his edition of Turner's Chemistry, 572.

38. The objection, that not being electrolytes the relation of acids and bases to the voltaic electrodes cannot be discovered, is easily remedied; since, on the union of a common ingredient with an anion and a cathion, there cannot be any doubt that the resulting compounds will have the same electro-chemical relation as their respective heterogeneous ingredients; so that, with the anion, an acid or electro-negative body will be formed; with the cathion, a base or electro-positive body. Moreover, as respects organic compounds which cannot be subjected to the electrolytic test, whatever saturates an inorganic acid must be a base, and whatever saturates an inorganic base must be an acid.

39. The word salt, I have shown, is almost destitute of utility, from the impossibility of defining it, and the amplitude of its meaning. A word that means every thing, is nearly as useless as that which means nothing.

(To be continued.)

ART. XXIII.—PURIFICATION OF NITRIC ACID.

BY M. E. MILLON.

The ordinary methods of purifying nitric acid by nitrate of silver, nitrate of baryta, or litharge, and desiccation, always leaves in the product a certain quantity of nitrous acid, which exercises a marked influence on the properties of the acid. The aqueous solution of hydrosulphuric acid has been adopted by M. Millon, as the best test for the presence of nitrous acid. The nitric acid to be tried should be diluted with once or twice its volume of water; the least trace of nitrous acid causes the liberation of sulphur, which gives an opalescent appearance to the liquor. At the same time, a small quantity of ammonia is formed.

When the nitric acid contains no organic matter, it may be obtained free from nitrous acid, by setting apart the first products of its distillation, which contains the whole of the nitrous acid; but the best and surest method to adopt, even when the acid contains organic matter, is, according to M. Millon, to mix bichromate of potash with the acid to be purified, in the proportions of one part to one hundred of acid. The nitrous acid is transformed into nitric acid at the expense of the oxygen of the chromic acid.

This addition is sufficient for the purification of nitric acid, the density of which does not surpass 1.48; but for acid of a greater density than this, it is necessary to resort to other means, for the acid is decomposed under the influence of heat, and cannot be distilled.

In preparing the concentrated acid from the acid of commerce, it is well to separate, by distillation, the first third of the acid, putting into the retort some platinum wire, or what is better, spongy platinum. There will thus be drawn

off, in the first third of the acid, more than half the water it originally contained.

There is then to be added to the residue remaining in the retort, its volume of concentrated sulphuric acid; a very dense acid will be obtained by the first distillation, and this may be brought to the highest state of concentration by repeated distillations. During the distillation from sulphuric acid, the nitric acid carries over an appreciable quantity with it; on the other hand, the sulphuric acid in the retort retains a portion of the nitric acid, although the temperature be raised to 680° Fahr. The combination of sulphuric and nitric acids described by Kulmann, is no doubt formed here, and which, as is seen, is decomposed with great difficulty. When the decomposition is effected, pure oxygen is disengaged, and there remains in the vessel a combination of sulphuric acid and deutoxide of azote.

When the nitric acid has been separated, by a second distillation, from the sulphuric acid which it had carried over, it always contains a large quantity of nitrous acid. When in this state, it should be put into the vessel in which it is intended to be kept, and the temperature being raised to the boiling point, a current of dry carbonic acid should be passed through it. It should then be allowed to cool, still continuing the current of gas. If the density of the acid does not exceed 1.50, one operation of this kind will be sufficient to render it colorless; but with more concentrated acid, it is necessary to raise the temperature to ebullition, two or even three times.

In those cases where, after the first purification, the acid is nearly colorless, the purification may be completed by adding some fragments of white nitrate of urea.

The most concentrated acid that M. Millon was able to obtain by the application of heat and a current of carbonic acid gas, was perfectly colorless, very fuming, and not rendered turbid by sulphuretted hydrogen, when diluted with two or three volumes of water. According to the analyses

of M. Millon, this concentrated acid contains exactly one equivalent of water, and represents the first degree of hydratation of nitric acid. According to calculation, the equivalent would be 14.24 to 100. Experience gives 15.07 for an acid, the density of which is 1.521 at 50° Fahr.

It has been generally admitted that concentrated nitric acid enters into ebullition at 187° Fahr. According to M. Millon, this appears not to be a fixed point, being retained only for a few moments by all the acids of a greater density than 1.50, 194°, 222°, and 232° Fahr., are analogous points, which occur, according to the quantity of the liquid, its density, the application of the heat, and several other circumstances, without the acid being fixed in its constitution. All the others contain a considerable quantity of nitrous acid, of which the heat alone does not deprive them. Thus nitric acid comes over in distillation mixed with nitrous acid, and its boiling point rises until it arrives at 253° Fahr. The acid which subsequently distils is colorless, and causes no precipitation with sulphuretted hydrogen. Its density is 1.484 at 64° Fahr.; this is an acid with two equivalents of water. It is only obtained to any extent in operating upon a large quantity of very concentrated acid. Seventeen pints afford about one pint. If the distillation be continued, the acid becomes more and more weak, until it arrives at that state of hydratation, at which it possesses considerable stability: it then contains four equivalents of water.

The general law relating to this distillation, has been well characterized by Dalton, who established one principle—that concentrated nitric acid becomes progressively weaker by distillation, whilst a weak acid is rendered stronger. M. Millon has observed, however, that the form of the retort in which the acid is distilled, and the presence of platinum wire, are capable of changing the point of ebullition, and even the nature of the product. In fact, in distilling a weak acid, without platinum wire, at a temperature from 257° to 262° Fahr., while the temperature was rapidly

rising, an acid was obtained of the density 1.20; on putting platinum wire into the retort, the point of ebullition fell to 252°, but the acid collected had only a specific gravity 1.175, instead of following the general rule with regard to the increasing density.

In distilling either a concentrated or a weak acid, the distillation of the last third of it presents some remarkable phenomena. A period arrives when the ebullition ceases; at the same time the thermometer, which stood at 250° or 252° Fahr., rises to 266°, or even 273°, and the acid passes into the receiver with great rapidity, without any appearance of bubbling or agitation; but it generally happens, that, in a few minutes there is suddenly disengaged an evolution of vapor, colored yellow by nitrous acid; the thermometer falls 14° or 18° Fahr., and in a few moments the ebullition recommences.

M. Millon concludes from these experiments, in relation to the distillation of the concentrated and the weak nitric acid, that the latter arrives at a state of hydratation, at which it contains four and a half equivalents of water, and has a density not greater than 1.405, at 68° Fahr., while the former tends to stop at a point at which its density is 1.419, and which contains four equivalents of water.

We may, therefore, obtain, says M. Millon, by the processes which I have described, four hydrates of nitric acid.

$$\begin{array}{l} Az\,O_5\ \ H\,O \\ Az\,O_5\,2\,H\,O \\ Az\,O_5\,4\,H\,O \\ Az\,O_5\,4\,H\,O\tfrac{HO}{2} \end{array}$$

Ibid, from Journal de Pharmacie.

ART. XXIV.—SIMPLE PROCESS FOR DETECTING THE PRESENCE OF MINUTE QUANTITIES OF IODIDE IN THE BROMIDES OF THE ALKALIES.

BY M. LASSAIGNE.

The presence of the iodides of the alkalies in the bromides, which are now prepared by chemical manufacturers with bromine, obtained from the mother-waters of sea-salt works, is more frequent than may be supposed. This circumstance arises, as is known to Chemists, from the difficulty of isolating bromine, which is liquid at ordinary temperatures, from small portions of iodine found in the state of bromide.

Various samples of bromide of potassium, met with in commerce, have always afforded to M. Lassaigne a very small quantity of iodine; and it has been by means of the very delicate indication of the presence of free iodine which starch affords, that he has been able to make this observation.

On adding to a solution of the bromide of potassium to be examined, a few drops of a weak solution of chlorine, the liquor will be immediately colored yellow; if now a piece of white starched paper be introduced, it will be colored violet, or feeble indigo blue. This coloration depends upon the proportion of iodine set at liberty by the first addition of chlorine to the impure bromide.

When a sufficient quantity of the solution of chlorine is added, to decompose the bromide of potassium, the starch-paper is not immediately colored; for, in this case, the iodine exists in the liquor in the state of bromide, which does not act on the starch; but these remarkable phenomena are presented, the paper being removed from the

liquor and exposed to the air, the wetted part assumes a red tint in about a minute or two; it then turns to violet, and, lastly, becomes blue. The same reaction takes place, but not in so short a time, if the starch-paper be allowed to remain in the liquor.

This effect, which is no doubt due to the decomposition of the bromide of iodine by the organic matter of the paper, and probably by the starch itself, affords the means of detecting the minutest quantities of iodine in the bromides of the alkalies.

Ibid, from Journ. de Chimie Médicale.

ART. XXV.—NOTES ON THE TALLICOONAH OR KUNDAH OIL.

BY MR. ROBERT CLARKE.

Senior Assistant Surgeon to the Colony of Sierra Leone.

The tree which furnishes the nuts from which Talli coonah or Kundah oil is procured, is found growing abundantly in the Timneh country and over the colony. At the village of Kent, near Cape Schilling, the oil is manufactured as follows:—The nuts are dried in the sun, then hung up in wicker racks or hurdles, and exposed to the smoke of the huts; when exposed for a sufficient time, the nuts are roasted and subjected to trituration in large wooden mortars until reduced to a pulp. The mass is then boiled, when the supernatant oil is removed by skimming. The natives principally manufacture the oil to afford light; the leaves are used by the Kroomen as a thatch.

I believe the medicinal properties of Tallicoonah or Kundah oil are unknown in Europe. Among the liberated Africans, the Sherbros and Soosoos, the oil is held in high estimation as an anthelmintic, the negroes and all classes of the colonists being very subject to worms. The sort of worms for which Tallicoonah or Kundah Oil proves efficacious are the tape, lumbicus, and ascarides, more especially the two former; administered, however, in the form of enemata, the oil is successful in bringing away great numbers of the latter. When employed as an enema, one or two ounces may be thrown into the bowels, dissolved in warm water, of a temperature sufficient to retain it in the liquid state. I have used it in large doses (as much as ℥iss) in "Lethargus,"* a disease of the brain in which it is desirable to act on the bowels with the most powerful drastic purgatives. Some of the colonists are in the habit of mixing with the palm and nut oils used to afford light, a portion of Tallicoonah oil, to prevent their servants from using the oil with their food.

I have employed it in cases of worms, or where I suspected their existence, in doses proportionate to the age and strength of the patient. In such cases the dose has ranged from one ounce to one drachm, fluid measure. It is here necessary to observe, that its purgative effects were by no means always uniform. In persons of weak habit of body, and in whom there existed any liability to bowel complaints, the Tallicoonah oil, from its acrid bitter properties, would prove injurious; but in persons in the opposite condition of body, I can confidently recommend this medicine as a safe and powerful anthelmintic. The usual way I have administered the oil is precisely similar to the modes in which castor or the other fixed oils are given. If given in proper doses, its purgative effects bear a close resemblance to those of castor oil, both in the length of time that elapses before

* See London Medical Gazette, Sept. 18, 1840.

its operation, and in the bulk of the stools produced. When over doses are taken, it produces the most violent hypercarthasis, cold sweats and vomiting, succeeded by collapse, and if remedial means are not promptly employed, even death. I may observe, that the negroes also use it as an expectorant. The best specimens are liquid, but it is more generally found concrete. The tree grows to the height of forty feet, the nuts being contained in a multelocular capsule. The oil is sold in the colony at two shillings a gallon, and could be procured in abundance from the coast as an article of commerce. I could spare to any of your medical friends, who wish to administer this oil as a remedy, a small quantity. I expect shortly to receive specimens of the root, stem, and leaf, and will forward them on their arrival.

63, *Vauxhall Walk, Lambeth, London.*

REMARKS ON THE ABOVE PAPER.

BY DR. PEREIRA.

"The 'nuts' described in Mr. Clarke's paper, are the seeds of the *Carapa Touloucouna* of the *Flore de Sénégambie,* a Meliaceous plant, figured in Sweet's British Flower Garden (i. 72,) and growing in dry places near Itou, on the shores of the Casamancia. The fruit is a large somewhat globular five-celled capsule. The seeds (of which there are from eighteen to thirty in each capsule) vary in size from that of a chestnut to a hen's egg: they are three-cornered, convex on the dorsal surface, of a brownish or blackish red color, and rugous. Specimens of the seeds with the fruit, are contained in the Banksian Collection at the British Museum. In the *Flore de Sénégambie,* the expressed oil of the seeds is called *Huile de Touloucouna,* and it is described as being sometimes liquid, sometimes solid according to the variable quantities of oleine and

strearine which it contains. A notice of its uses is said to be contained in the *Ann. de la Societé Linnéenne de Paris*, for May, 1824, but I have had no opportunity of consulting this work. The oil owes its bitterness to an alkaloid principle, which MM. Petroz and Robinet (*Journal de Pharmacie*, t. vii. p. 48,) found also in the bark of the tree."

Mr. Redwood observed, that he had made a few experiments to determine some of the most prominent characters of the oil.—He found it to be entirely soluble in ether, and that alcohol separated it into two parts, a concrete substance, which was dissolved, and an oil fluid at ordinary temperatures, on which the alcohol took no effect. The former contained the bitter principle and the nauseous odor of the oil, the latter was nearly colorless and tasteless.

London Pharm. Transactions.

ART. XXVI.—COMPOUND DECOCTION OF ALOES.

Mr. Bland has favored us with the following remarks on this subject:—

"The decoction of aloes, as usually met with, deposits on standing, a copious and unsightly precipitate; this I consider arises from one of the following causes: either, first, the impurities contained in the extract of liquorice; second, the imperfect solution of the aloes and myrrh; or third, the decomposition of the aloes. With respect to the extract of liquorice, I find it difficult to procure it sufficiently pure; I, therefore, always use the common Italian liquorice (Solazzi juice) having first purified it by dissolving in distilled

water at 60°, and filtering the solution; a large quantity of impurity, consisting of ligneous matter, copper scrapings, &c., is separated, and a pure fine flavored solution of liquorice is the result. Having thus got rid of the first source of difficulty, I proceed as follows:—rub together the aloes, myrrh and carbonate of potash, add the solution of liquorice,* the rest of the distilled water and the saffron, and boil gently until reduced to the proper quantity, set aside the decoction until cold, strain through any substance of rather open texture, (a piece of muslin answers quite well) and add the tincture of cardamoms; during the next forty-eight hours a slight precipitate falls, after which no further change takes place. It is necessary that *distilled* water should be used, that the myrrh and aloes should first be well mixed with the carbonate of potash (not added indiscriminately to the water,) and that the tincture of cardamoms should be made with *proof* spirit, and not with a mixture of equal parts of rectified spirit and water, as sometimes practised. By attending to these directions, an efficient and uniform preparation may be always depended upon, and decoction of aloes thus made will keep perfectly well in a cool place for several months. The separate maceration of the saffron, as proposed by your correspondent in last month's Journal, would perhaps be desirable, as I find that the color of saffron (its only valuable property) is injured by boiling. I consider that a resinous soap is formed by the combination of the potash with the resin of the myrrh and aloes, and that the soap is *dissolved* and not held mechanically in suspension, for decoction of aloes is, if carefully prepared, perfectly bright, and in this state it is sent out from Apothecaries' Hall."

* We doubt whether any advantage is derived from boiling the extract of liquorice, which may be dissolved in a portion of the water, and added to the solution of myrrh, aloes, and potash, after the subsidence has taken place.—Ed. Pharm. Journal.

Mr. Tyson particularly objects to the use of Spanish liquorice, and thinks only the English extract should be used. He also objects to the myrrh, which he considers "worse than superfluous," and recommends English saffron.

Mr. Fisher (of Ramsgate) states, as the result of his experiments on the Compound Decoction of Aloes, that cold maceration is a much better process than the boiling, which is usually adopted. We have seen a sample of the preparation made in this manner, the ingredients having been merely macerated together for two or three weeks, and its appearance, flavor, and smell were remarkably good. We are informed by the maker of this decoction, that its effect is uniform and satisfactory, that it is always bright, and retains its properties longer than the decoction prepared in the usual way. With respect to the extract of liquorice, it is evident, that if the foreign be employed, it ought previously to be purified, as Solazzi juice contains generally between thirty and forty per cent. of impurities. English saffron is an article with which we are not acquainted.

Ibid.

ART. XXVII.—ON THE TRANSFORMATION OF CALOMEL INTO CORROSIVE SUBLIMATE, UNDER THE INFLUENCE OF THE CHLORIDES OF THE ALKALIES.

BY M. LEPAGE.

M. J. Righini D'Ollegio, in a note relative to the action of steam on the protochloride of mercury, has given the result of some experiments which he undertook with the view of determining whether, as has been stated latterly, the protochloride of mercury is transformed into the perchloride under the influence of the chlorides of the alkalies, at the temperature of the human body.

The conclusions announced by this Italian Chemist have been entirely corroborated by the repeated observations I have made on the same subject. The following are the results of my experiments:—

1st. Protochloride of mercury, perfectly free from perchloride, and mixed with an equal weight of hydrochlorate of ammonia, or of a chloride of an alkali, digested in distilled water at a temperature of from 100° to 104° Fahr., during twenty-four, thirty-six, and even forty-eight hours, does not change color. The liquor, when filtered, has never indicated, by any reaction, the presence of even a trace of a mercurial salt.

Pigeons that were made to drink this liquor during several days in succession, suffered no injury. There appeared to be no diminution in the original weight of the calomel.

2d. The same mixture, exposed to a temperature from 120° to 140° Fahr., afforded a liquid which comported itself with reagents, and in its action on the animal economy precisely the same as the last mentioned.

3d. Nevertheless, by continued boiling, and under the influence of a large excess of chlorine, the transformation does take place; but it is even then only partial.

Ibid, from Journ. de Chimie Médicale.

ART. XXVIII.—ON GAMBOGE.

BY DR. BUCHNER.

This substance is obtained from several plants, as Garcinia Gambogia, Gambogia Gutta (Linnæus,) Mangostana Gambogia (Gaertner,) Stalagmites gambagioides, Hypericum bacciferum and cayanense, natives of the East Indies, Siam, and Ceylon, whence it is imported in form of small cakes and rolls, or cylindrically-twisted masses. Its composition, according to Christison, is resin, gum, fecula, fibrine, and water. The resin must be regarded as the chief constituent, and is most abundant in the Ceylon variety: it contains about 75.5 per cent., and is therefore the best for technical purposes, as painting. Powdered gamboge, treated with æther and evaporated, leaves a resin which retains a certain portion of the æther, and has a glutinous property, which it only loses when exposed to a very high temperature. The qualities of the resin are those characteristic of an acid, and, indeed, those of a fatty acid. Its composition gives, as demonstrated, by consuming it with oxide of copper, this per centage composition:—

	I.	II.
Carbon,	71.87	72.22
Hydrogen,	7.06	7.41
Oxygen,	21.07	20.37
	100.00	100.00

To determine the atomic weight of the acid, the salts of silver, lead, and barytes were subjected to analysis. The results were as follows:—

Salt of Silver,	$C_{60} H_{35} O_{12} + Ag O$.
Salt of Lead,	$2 C_{60} H_{35} O_{12} + 5 Pb O$.
Salt of Barytes,	$4 C_{60} H_{35} O_{12} + 3 Ba O$.

Johnston found, in 100 parts of the resin of gamboge in the uncombined state:

Carbon,	71.70
Hydrogen,	7.03
Oxygen,	21.27

Whence he calculated the formulæ, $C_{40} H_{23} O_9$ and $C_{48} H_{24} O_{10}$, which give, with the metallic oxides, results varying but little from those deduced from the above analysis.

After extracting the resin of gamboge by æther, the residue was digested in pure alcohol, the result of which was a glutinous substance, which on distillation left a glutinous brown extract, soluble in water, a property distinguishing it from the fatty acid extracted by æther. It exists but in very small proportions. The residue, remaining after the treatment of gamboge with æther and alcohol, when boiled in water, left only impurities of wood and sand mixed with the gamboge of commerce; whilst the solution, on account of its mucilaginous properties, would not pass through a filter. Diluted with water and drawn off by a syphon, the fluid was concentrated by evaporation. The gum thus obtained was digested and washed with spirit until it was

nearly colorless, and dried at 100° C.; this yielded, when finely powdered, a yellowish white powder. By analysis he found its composition as follows:

	I.	II.
Carbon,	44.00	44.94
Hydrogen,	6.22	6.11
Oxygen,	49.78	48.95
	100.00	100.00

From these analyses it follows, that this substance has the elementary composition of starch, or anhydrous sugar, as may be seen in comparing the annexed table.

	Gum of Gamboge.	Gum Arabic.	Starch or Anhydrous Cane Sugar.
Carbon	= 44.94	42.58	44.91
Hydrogen	= 6.11	6.37	6.11
Oxygen	= 48.95	51.05	48.98
	100.00	100.00	100.00

This composition led to the inference that the gum treated with nitric acid might be converted into mucic acid, or, by treating with dilute sulphuric acid, into sugar, an inference which experiments proved to be well founded.

Gamboge owes its color to the fatty acid; with water it forms an emulsion, the water dissolving the gum, and a small quantity of a brown-red coloring matter, into a mucilage, in which the coloring matter is held in suspension. This examination finally proves, that the resin of gamboge resembles a fatty acid, that it contains a small quantity of a peculiar red-yellow coloring matter, soluble in water and alcohol, and a greater quantity of a gum-like substance, having the composition of flour of starch, which, by sulphuric acid, may be converted into sugar not capable of undergoing fermentation.

The analysis of two specimens of gamboge, given by Professor Christison to Professor Liebig, gave the following results:

	Analysis of NO. I.	Analysis of NO. II.
Fatty acid, soluble in æther,	= 79.794	78.841
Coloring matter, soluble in alcohol and water,	= 0.573	41.030
Gum,	= 19.519	12.595
Residue,	= 0.114	4.534
	100.000	100.000

The residue of No. II. consisted chiefly of particles of wood-dust and sand.

The specimen No. I. was labelled "Finest Siamese cane gamboge from Singapore, from a sample never met with in commerce."

No. II. was labelled "Ceylon gamboge, prepared for native commerce, but never met with in the commerce of Europe."

Ibid, from Annalen der Chemie und Pharmacie.

ART. XXIX.—ALBUMINATE OF IRON.

BY MR. A. J. COOLEY.

This preparation, better known in France than England, is usually prepared by the following method:—

Albumen, or white of egg, is diluted with distilled water; the mixture is filtered, and a solution of persulphate of iron is added until precipitation ceases; the deposit is then washed and dissolved in alkalized* alcohol. It is very evident, however, that this solution does not answer to its name, and in this state, from the amount of alkali it contains, will prove unfit for administration, in many cases where chalybeate tonics are indicated.

It has been my endeavor to remove this objection, and after some experiments for that purpose, I find the solution of albuminate of iron is best made by dissolving its hydrous oxides in the newly diluted and filtered white of egg, which takes up a considerable portion of both the freshly precipitated protoxide and sesquioxide. The liquid may be filtered, and will be found, by testing, to contain a large proportion of metal. In the case of the sesquioxide in particular, the solution will keep for some time without decomposition, and its permanence may be further increased by adding a little alcohol, with which it will mix without precipitation. In this respect it resembles many other preparations of the same oxide. I have now before me two four-ounce phials of this preparation—the one with spirit, the other without any. The simple solution was made about ten days since, and placed in a temperate situation, loosely corked, for the

* Caustic potassa must be used.

purpose of ascertaining its conservative powers. It is barely so clear as it then was, but differs in no other particular. The other phial, to which a little alcohol was added, has kept nearly three weeks without any visible alteration. When tested for iron, they both yield precipitates as before. It may be further remarked, that this preparation is compatible with caustic solution of potassa, and no doubt the other alkalies and their carbonates.

As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will, no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

The Chemist.

ART. XXX.—OBSERVATIONS ON CYANIDE OF POTASSIUM AS A REMEDIAL AGENT.

By Mr. David Stewart, of Baltimore.

This compound of cyanogen has been recommended as a substitute for prussic acid, and when it is desirable to obtain the effects of that valuable agent in combination with medicines which cannot easily be administered except in powder, it is a convenient substitute for it. Several difficulties, however, attend its use in any form. One of the most formidable is its variable effect resulting from its partial or

total decomposition on entering the stomach—an effect which unfortunately cannot be controlled by the physician, as the weakest acid will decompose it in preference to uniting with carbonate of soda, magnesia, or any other compound with which it is usually administered. Should it meet with free carbonic acid in the stomach, prussic acid would gradually be eliminated, producing the pleasant effects which often result from its exhibition; but when it meets with a stronger acid in sufficient quantity, 10 minims or ℈i of prussic acid are at once liberated, causing vertigo, peach kernel eructations, and other distressing consequences.*

In an article published in this Journal, Vol. 1, No. 1, p. 264, I endeavored to show, from the authority of some of the first chemists in Europe, that it was very liable to vary in strength during the most careful preparation, and that it is extremely apt to suffer decomposition from various causes, after it has been prepared in the most judicious manner. Its subsequent introduction into the new Pharmacopœia, and its popularity among the physicians of our city, have led me to test the veracity of the eminent chemists† referred to, as to its variable quality. I procured six samples from six of the best retail stores of Baltimore, where the great proportion of prescriptions are compounded. Each was carefully weighed with the same weight, and immediately transferred into a solution of nitrate of silver in dilute nitric acid, using the same proportion of nitrate in each case. The result was an insoluble precipitate of cyanide of silver, corresponding with the proportion of cyanogen existing in the cyanide of potassium.

* These results have followed its exhibition in medium dose on several occasions in our city, in the hands of some of the most eminent physicians, and those who have used it most frequently.

† Dr. Trouve, MM. Pelouse and Gieger, and M. Boidet.

The first was prepared according to the process of U. S. Pharmacopœia, modified by the use of a water bath in evaporating the salt.* 5 grains yielded,	11 grains of cyanide of silver, or about 109 grains of prussic acid.
No. 2, prepared from alcoholic solution—[See Maryland Medical Journal, Vol. 1, No. 2, p. 201.] 5 grains yielded,†	5 grains cyanide of silver, or 49 minims of prussic acid.
No. 3, prepared recently as No. 1. 5 grains yielded,	9½ grs. cyanide silver, or 94 prus. acid.
No. 4. 5 grains yielded,	6 grains cyanide of silver, or 59 grains prussic acid.
No. 5, prepared by one of the most careful and experienced manufacturing chemists in Philadelphia. 5 grs. yielded,	7 grains cyanide of silver or 69 minims of prussic acid.
No. 6, French manufacture. 5 grains yielded,	6 grs. cyanide of silver, or 59 minims prussic acid.

I think we have now proved from the best authority, and from actual experiment,

First, That if cyanide of potassium could be prepared of a definite strength, its effects must vary exceedingly, and that its use may be attended with the most dreadful consequences, should several doses accumulate in the stomach or intestines, and be followed by an acid.

Second, That it is liable to be decomposed during the most careful preparation.

* G. W. Andrews, M. D., suggested this modification at a meeting of Maryland College of Pharmacy.

‡ The gentleman from whom I obtained this sample has since given me the assay of five grains recently prepared by the same formula which indicates 95 grains of prussic acid.

Third, That when prepared in the best manner it is constantly liable to change, from causes that cannot be avoided, in dispensing it.

Fourth, That the process of the U. S. Pharmacopœia modified by evaporation in a water-bath is the best process yet proposed for preparing it.

Fifth, That its only value with reference to prussic acid is the facility with which cyanide of silver is formed by its decomposition, as indicated in the assay of the above samples. Moreover, I may remark that the necessity for a substitute for prussic acid has ceased,—since the merest tyro can prepare that acid extemporaneously of invariable strength, without any apparatus except a glass vial, by the beautiful process of the last Pharmacopœia.*

Maryland Med. & Surg. Journal.

* Should the muriatic acid used in the process referred to be in excess, (in the absence of a specific gravity measure,) it will only tend to preserve it; and if the chloride of silver is lost, the result is less expensive than the commercial prussic acid.

ART. XXXI.—THE FERRUGINATED PILL OF MERCURY.

BY DR. COLLIER.

The varying and unsatisfactory quality of our "blue-pill" has for many years attracted attention. In my second edition of the London Pharmacopœia, I gave the outline of a formula for preparing it with sesquioxide of iron; the further experience of years enables me to offer this preparation as a boon to the profession and to the public, for it may be proved that the iron enters along with the mercury into the blood, and saves the wear and tear of the human body under its use. I will not at this time canvass, because I doubt, the probability of the sesquioxide (in double equivalents) yielding up one atom of its oxygen to the mercury, as is the opinion of several chemists to whom I have submitted this compound. I am aware that other peroxides, when moist, will similarly combine and divide mercurial globules; and I will not now enter upon the series of incomplete experiments instituted by myself to prove that mercury will amalgamate with other metallic oxides, and in this state form double or triple salts with acids. I shall now keep only to the practical utility of my compound, and to its importance as a great remedial improvement.

The following is the formula:

℞. Ferri sesquioxydi, ʒj.
Hydrargyri, ʒij.
Confect: Rosæ Gallicæ, ʒiij.

Contere donec globuli non amplius conspiciantur.

It is made in five minutes; common blue-pill demands a week. The globules are not visible, even by the microscope. It is uniform in its appearance and effects. It makes a smoother pill, retaining its form more permanently. It salivates in a few days in the usual doses. It is particularly

eligible for the strumous, the irritable, and for reduced anemial constitutions requiring mercury. The powers of life are not so much (scarcely at all) prostrated under its use. Its resolvent power is greater than that of mercury alone, especially with respect to buboes. Practitioners will at all events know what they are using; at present they have for blue-pill all manner of alloys and sulphurets—mercurial-zinc pill, mercurial-sulphur pill, &c. &c.

Five grains of the sesquioxide will suffice to amalgamate and divide a large quantity of mercury, but I propose the larger proportion as a remedy.

London Lancet, March 11th, 1843.

[The facility with which mercury may be reduced to a state of minute division by means of vegetable extracts, has already been pointed out in this Journal, vol. i., page 203, the time required for this purpose varying from ten minutes to half an hour, according to the nature of the extract employed. The therapeutic value of Dr. Collier's preparation, as detailed in the above paper, entitles it to the consideration of the profession, as a new remedy, but we cannot recommend the use of any succedaneum in the preparation of the blue pill of the Pharmacopœia. A strict adherence to the order of the college produces a result uniform in strength and appearance.—Ed. Pharm. Journal.]

ART. XXXII.—ON SYRUP OF POPPIES.

BY MR. THOMAS SOUTHALL.

Having found great difficulty in obtaining an elegant preparation of syrup of poppies, by the process directed in the London Pharmacopœia, we have tried various means of improving it, and think we have succeeded in doing so by extracting the virtues of the poppy by percolation with cold water, and, as far as we can judge, without impairing in any degree the efficacy of the syrup.

The capsules, from which the seeds have been separated, are weighed, and then dried, by which they lose from ten to fifteen per cent. They are then bruised, and passed through a sieve of three-eighths of an inch mesh. They are next macerated in a mash-tub, several portions of cold water being added, and stirred with them, to ensure the whole being uniformly moistened. About an hour afterwards, the infusion is drawn off from the bottom of the vessel, more water being poured on the surface; after which the infusion is allowed to run off during the day. The quantity of water used is about the same as that which is directed in the Pharmacopœia. The infusion is evaporated as it is drawn off, to nearly the consistence requisite for making the syrup, and allowed to stand during the night. The clear portion is poured off the following morning, the remainder strained through a calico bag, and the sugar is dissolved in the clear liquor with as much heat as is requisite for the purpose. The medicinal properties of the poppies appear to be extracted effectually by means of cold water, while the syrup is brighter and of better quality, on account of the absence of the starch, which is dissolved in it, if boiling water is used in making the infusion.

The poppy capsule appears to contain both albumen and starch, and when the former is solidified, and the latter converted into a jelly by the application of boiling water, the medicinal principles of the poppies are extracted with more difficulty. Syrup of poppies, as usually prepared, is very liable to fermentation; this I attribute chiefly to the presence of the starch, which is favorable to this kind of decomposition, and which, by increasing the density of the fluid to a consistence approaching to that of a jelly, obstructs the separation of the fæces by decantation or filtration.

London Pharm. Transactions.

ART. XXXIII.—ON THE PROPER TIME FOR COLLECTING CERTAIN ROOTS.*

BY DR. BUCHNER.

The importance of determining which is the best period of the year for collecting certain medical plants has been pointed out by Buchner. Neutwich employed the following method for the purpose of ascertaining this point. The plan, although short and easy of execution, does not give any idea of the peculiar constituents of the samples:

He cleansed the fresh roots from adhering earth by means of a brush; a certain quantity was then dried in the air, and its loss of weight remarked; it was then boiled several times with water, the extracts evaporated down to oz., cla-

* Pharm. Central Blatt., 1842, p. 688; as given in the London and Edin. Monthly Journal of Medical Science, Jan. 11, 1843.

rified with white of egg, filtered, edulcorated, and the filtered solution reduced to four oz., and when cold the specific gravity determined.

Only the following roots have as yet been examined:—

NAME OF THE ROOT.	*Quantity employed.*	*Dried in the Air.*			*Quantity of Dried Root Extracted.*	*Spec. Grav. of the Clear Ext. Evap. to 3 oz.*
	oz.	℥	ʒ	gr.	oz.	
Rad. Taraxaci in Autumn	12	3	2	52	2	1.120
" " Spring	12	2	4	12	2	1.095
Rad. Bardaniæ in Autumn	12	3	2	36	2	1.147
" " Spring	12	2	0	0	2	1.062
Rad. Saponariæ in Autumn	6	2	0	56	1	1.044
" " Spring	6	1	5	3	1	1.032
Rad. Cichorei in Autumn	6	1	5	39	1	1.080
" " Spring	6	1	2	8	1	1.040

The Chemist.

ART. XXXIV.—ON THE FORMATION AND COMPOSITION OF SESQUICARBONATE OF SODA.*

BY HERMANN.

The former opinion, that the sesquicarbonate of soda is formed by the ebullition of solutions of bicarbonate of soda, which should then allow half an equivalent of carbonic acid to be disengaged, has already been refuted by Rose. That chemist has found that the solutions of bicarbonate of soda completely disengage their second atom of carbonic acid by exposure *in vacuo*, or by long boiling. He has not succeeded in obtaining crystals of sesquicarbonate of soda with solutions composed of equal atoms of bicarbonate and simple carbonate of that base.

The conditions in which the sesquicarbonate of soda is formed were hitherto unknown. Hermann thinks he has found them. This salt is not produced by crystallisation in aqueous solutions; it is then decomposed into bicarbonate and carbonate of soda, which crystallise separately; but it is very easily formed, according to this chemist, by efflorescence.

If, then, we promptly combine by the boiling, concentrated solutions of bicarbonate of soda, and if we thus prevent the second atom of carbonic acid from being completely disengaged; if we fuse together equal atoms of bicarbonate and simple crystallised carbonate of soda, in the water of crystallisation of the latter, and if the mass be dried; finally, if bicarbonate of soda be heated to a temperature not exceeding 200° C., saline masses are obtained, which consist chiefly of sesquicarbonate of soda. To obtain them in the crystallised state, it is sufficient to expose them for some time to the action of damp air, especially in cellars.

* Journal für Praktische Chemie.

If they are examined at the expiration of a few weeks, it is found that they have assumed, by absorption of water, a perfectly crystalline appearance.

The quantitative analysis of this salt has demonstrated that the present formula ($So\ O^2.\ 3C\ O^2+4H\ O$,) is not quite correct, but that its composition corresponds to the formula $So\ O^2.\ 3C\ O^2+3H\ O$.

100 parts gave:—

Soda	40.00
Carbonic acid	43.06
Water	16.94
	100.00

Which gives—

		Calculated in 100 parts
2 at. soda	= 781.8	40.12
3 " carbonic acid	= 829.2	42.56
3 " water	= 337.4	17.32
1 " crystallised sesquicarbonate of soda	= 1948.4	100.00

Heated to redness over a spirit lamp, sesquicarbonate of soda leaves, the same as the bicarbonates of potassa and soda, a portion of carbonate. It partakes, then, with these bicarbonates, the peculiarity of allowing the excess of carbonic acid to be more completely disengaged by the ebullition of its solutions, than by the calcination of the dry salt. *Ibid.*

ART. XXXV.—PRECAUTIONS TO BE ADOPTED IN THE EMPLOYMENT OF ALKALINE DRINKS AS LITHONTRIPTICS.*

It cannot be denied that, in certain circumstances, calculi are formed in the bladder under the influence of the continued and unmethodical administration of alkaline medicines. Must it be concluded from this, says M. Bouchardat, that bicarbonate of soda is useless, and even dangerous, in the treatment of gravel and calculus? Certainly not; but it is necessary to know how to aid this powerful means, in order that it may render all the services which we have a right to expect from it. According to this physician, the two indispensable adjuvants of all lithontriptics are: 1st, abundant aqueous drinks; 2d, a moderate surrounding temperature. When alkalis are prescribed, it is not absolutely necessary that they should be as concentrated as they are generally ordered: 1st, because drinks so powerfully medicated are not so easily absorbed; 2d, because a sufficient quantity cannot be swallowed every day without disgust and inconvenience. Thus, for example, the waters of Vichy contain much more alkali than is necessary, for one gramme of bicarbonate of soda is quite sufficient for one quart of water.

It is always to the bicarbonates that we should have recourse. What greater advantage, indeed, can be expected from the subcarbonates and from caustic alkalis? Evidently none; for, during the assimilation, they are converted into bicarbonates; and it is in this state that they exist in the blood. The more caustic alkalis, therefore, present the inconvenience of more powerfully attacking the digestive apparatus without ulterior advantage. When the fatigued

* Journal de Chimie Medicale.

stomach is no longer able with the same ease to bear water holding in solution bicarbonate of potassa or soda, these salts may even be replaced by citrate of soda, which, during the assimilation, is converted into bicarbonate of soda, and which, finally, has the same influence as the latter salt on the composition of the urine.

The following drink may be prescribed:—

℞. Bicarbonate of potassa	1 gramme.
Water	1 quart.
White sugar,	50 grammes.
Tincture of vanilla,	5 grammes.

Mix and dissolve.

According to the taste of the patients, the tincture of vanilla may be substituted by tincture of cinnamon, tincture of orange, tincture of citron, &c., in the dose of one gramme, and the bicarbonate of potassa by bicarbonate of soda, or by a double dose of the citrate or malate of the latter base. The essential point is to give the patient a drink which will please him without fatiguing his stomach, and without causing disgust—and this is really a very difficult matter in some circumstances. The beneficial action of certain mineral waters in cases of gravel, may certainly be attributed to these waters being easily borne by the stomach, easily digested, and that a very large dose of them may be taken daily. This is the secret of the efficacy of the waters of Contrexeville. Indeed, the small proportion of iron which these springs contain, and the carbonic acid which they disengage, excite the stomach, and large quantities of the water may be daily swallowed with impunity, without fear of disorder in the exercise of the digestive functions.

As regards what is meant by large quantities of water, it is a point which may be very variable according to the individuals; but the following is a rule which M. Bouchardat indicates as a very easy guide in this respect: the urine of a healthy man becomes turbid, and deposits by cooling,

when abundant aqueous drinks are not swallowed; on the contrary, it always remains limpid in the latter case, if, however, excessive perspiration does not exist. When lithontriptic drinks are made use of, the urine must be daily observed, so that it may be brought to such a state as not to deposit by cooling. When this result is arrived at, says M. Bouchardat, the gravel will disappear, and the calculi will be gradually dissolved, for there is established in the bladder a continual exchange between the bladder and the calculus. If the urine is concentrated, it deposits; if it is not saturated, it dissolves. All efforts must, therefore, be directed to maintaining it in the latter state.

Three or four quarts of aqueous drinks in the twenty-four hours are most commonly sufficient for attaining this end; six and more are sometimes required. But these lithontriptics are, in general, really and surely useful only when the urine remains limpid after cooling.

Drinking is not all that is required, adds M. Bouchardat, in conclusion, for obtaining abundant urine; perspiration must also be avoided. This is easily obtained by wearing a moderate amount of clothing, by carefully avoiding too rapid motions, and by rubbing the surface of the skin with a fatty body. *Ibid.*

ART. XXXVI.—NOTE ON A BLUE URINE.*

BY M. A. BOUCHARDAT.

This urine, which was voided before Dr. Priesnitz, was sent to Dr. Schmitz, who transmitted it to M. Bouchardat. It was passed by a patient who had resided for 27 years at Surinam, and who had been during that period affected with two very obstinate intermittent fevers, accompanied by a very considerable enlargement of the spleen and liver. This patient, after having without success undergone many courses of treatment, and after having taken considerable quantities of quinine and port wine, went, in 1839, to Gräffenberg, where he was submitted, for nine months, to the hydrosudopathic treatment, without deriving much advantage from it; indeed, if the powers were restored, the swelling of the spleen and liver always appeared. In the ninth month, he had observed that the wetted compresses applied to the abdomen were stained with brown-red stains, similar to those which are produced by decoctions of quinquina. Fifteen days afterwards, he remarked, in the morning, that his urine had changed color, that it had become dark; and some hours afterwards, he found that it was perfectly blue, after which it passed successively to green, then to blackish. This phenomenon continued for about a fortnight, and, at the end of that time, the cure was completed. The patient remained eighteen months at Gräffenberg, to acquire strength and to perfect his return to health: from that time, there has not been the slightest appearance of relapse, and the liver and spleen have returned to their normal size.

Dr. Schmitz has three times observed blue sediments in

* Journal des Connaissances Médicales Pratiques, July, 1842.

the urine of patients subjected to the hydrosudopathic treatment; two affected with syphilis, and an old Dane who had obstructions of the abdominal viscera. One of the two syphilitic patients had been submitted to mercurial treatment; the other had not taken mercury. In all three cases, the blue sediments were observed in the period of cure.

The same physician has observed, besides, sediments of the same color in the urinary of the establishment of Priesnitz.

To return to the urine in question: the following are the peculiarities observed in it by M. Bouchardat:—

1. It exhaled a powerful ammoniacal odor; its taste was saline; it had a deep blue color; it deposited a sediment of a fine blue.

2. Examined with the microscope, the sediment seemed to be formed of globules of excessive tenuity, of great regularity of form (which was ovoid) and of dimensions, which may be estimated at about one-third of those of the globules of human blood.

3. This urine returned the blue color of litmus paper reddened by an acid.

4. Reagents detected in it the presence of phosphates, sulphates, chlorides of lime, magnesia and ammonia.

5. The blue coloring matter partly dissolved in ether, to which it imparted a blue color; the ethereal liquids being evaporated, furnished a very slight residue of a fixed oil of a repulsive odor.

6. Alcohol partly dissolved, by aid of boiling, the coloring matter, and left a residue of a deeper color.

7. Nitric acid destroyed the coloring matter, and furnished a straw-colored liquor.

8. Sulphuric acid, diluted with twice its weight of water, did not cause any change.

9. The solution of oxalic acid dissolved the coloring matter, and a blue liquor was obtained, which, when filtered, was very limpid.

10. Ammonia did not produce any alteration in the coloring matter.

11. Potassa disengaged ammonia, and, by boiling, destroyed the coloring matter.

According to M. Bouchardat, this urine appeared to contain the saline principles of ordinary urine: as regards the coloring matter, it was quite special, and the microscopical examination as well as the action, induce the belief that it was a peculiar organic substance.

What can have been the origin of this singular matter? It is known that, under the influence of hydrochloric acid, albumen gives an intense blue color, which is not altogether unlike the product in question; but, in the economy, this acid is never found in a state of concentration sufficient for producing this conversion.

M. Bouchardat concludes by adding, that he observed, twelve years ago, a blue coloring matter which bore the greatest resemblance to the sediment of this urine, and which acted in exactly the same manner with reagents; it was produced by the spontaneous alteration of gluten, kept in dry air. It may be admitted, according to that, that albuminous matters are susceptible of being spontaneously converted, in certain rare and undetermined circumstances, into organic globules of a fine blue color. *Ibid.*

ART. XXXVII.—PREPARATION OF CITRATE OF IRON.

BY M. HECTOR BERNIER.

In the Journal de Chimie Médicale for December, 1842, M. H. Bernier publishes the following method of preparing citrate of iron:—

℞. Pure protosulphate of iron	1
Carbonate of soda	1.5

After having separately dissolved the salts, the solutions are mixed: the precipitated carbonate is collected on a filter, and washed with distilled water to free it from any sulphate of soda which it may retain; after this washing, it is put into a porcelain capsule with a little distilled water; pure citric acid dissolved in the smallest quantity of water is then added to the liquor, which is kept stirred, until the carbonate of iron is partly decomposed; the liquor is then left to itself for one or two days, and occasionally stirred. If the carbonate of iron is not entirely dissolved, a few drops of citric acid are added, and it is filtered.

In this manner a very concentrated solution of citrate of iron is obtained, and nothing further is required but evaporating it in flat-bottomed porcelain plates, at a temperature of 25° to 30° C.

This process yields citrate of iron of a fine garnet color. We may thus, with almost all the weak acids, prepare salts of iron. *Ibid.*

ART. XXXVIII.—PREPARATION OF SOLUBLE CREAM OF TARTAR.

BY M. CAMBORNAC.

℞. Bitartrate of potassa	400 gr.
Borate of soda	200 gr.
Tartaric acid	11,000 gr.

I dissolve the salts and the acid together; when the solution is complete, I clarify it with white of egg, and filter. I again put it on the fire and continue the operation as directed by the Codex. The product is of a decided acid taste, very soluble, and possessed of purgative properties as active as those of ordinary cream of tartar; and is decidedly preferable to the latter.

Ibid, from Journ. de Chimie Médicale.

MISCELLANY.

*Decoction of Nut-Galls as an antidote for Cicuta Virosa, Hemlock.** By Dr. Meyer, of Creutzburg.—On the morning of the 19th of March, 1841, four children, of three, five, and six years of age, found in the neighborhood of the village in which they lived, some roots of *cicuta virosa*, which had been carried there by the current of a rivulet, and, having mistaken them for parsneps, they ate the greater portion of them. The child aged three years was very soon attacked with colic, vomiting, and convulsions, and died at 1 P. M., without any treatment having been resorted to.

The parents, who had learned this circumstance from the other three children who were affected in the same manner, and who had found in their hands another root of cicuta, made them drink milk in abundance, and at the same time sent for a surgeon, who immediately requested the assistance of Dr. Meyer.

On the arrival of this physician, at about 2 o'clock, the three little patients had already taken ipecacuanha, but only a few and very scanty vomitings had resulted from it. The body of each of these children was cold, the countenance pale and wan, the pupils much dilated and fixed; there were violent colics, and spasmodic motions throughout the body; two of them had entirely lost consciousness, while the third regained his senses from time to time, and complained of singing in the ears and vertigo, after which he again fell into a comatose state. The respiration, in one of the children, was feeble and scarcely perceptible; but in the other two it was irregular, stertorous, and occasionally interrupted by sighs. The motions of the heart did not present their normal regularity; they were occasionally stopped for a longer or a shorter time, then they returned in a tumultuous manner; the arterial pulsations, slow in general, presented nearly the same anomalies.

Large doses of sulphate of zinc were immediately administered to the three patients, and several vomitings, accompanied with violent shocks,

* Journal de Chimie Medicale; from a German periodical not quoted.

very soon resulted: many pieces of the root of cicuta, softened by its stay in the stomach, were recognised in the vomited matters. The vomitings were aided and maintained by means of diluents, and by frictions of the epigastric region. At the same time glysters, to which vinegar was added, were administered, cold compresses were applied to the head, and a powerful revulsion exerted on the limbs, by means of cataplasms of mustard and horseradish. The extremities, which were of icy coldness, were rubbed with well warmed flannels, and heat was thus restored to them.

At the end of an hcur, the state of stupor, the spasms and colics, began to diminish a little, in proportion as the vomiting and purging became more frequent. It should be noticed that the matter of the alvine dejections was liquid and colored yellow by bile.

A decoction of nut-galls, which had been prepared in the interval, was now administered in large and frequent doses during the first day, then in smaller and less frequent doses during the two following days. The results of this treatment were most favorable, for all the alarming symptoms gradually diminished, and, at the end of five days, the three patients were entirely recovered: from that time nothing but a simple and mild diet was prescribed for them.

The decoction of nut-galls already recommended by Drs. Phœbus and Meurer, or if preferred, the tannin, which is its active principle, in this case produced all that could be desired of an antidote. Indeed, the root, which was in all its power, contained a very strong poison, and it had been taken in great quantity, since the second root, which was less than that which had been eaten by the children, weighed 60 grammes. Moreover, the poisoning took place at 10 o'clock in the morning, a time of day at which the stomach is almost empty, because in the country it is customary to breakfast very early, Finally, the poisonous principle had had, during four hours, all the time necessary for developing its injurious effects on subjects so young and so highly sensitive to impressions.

The poisoning was very violent, as the symptoms have sufficiently shown; nevertheless, the antidote, after having been preceded by vomitings, in a short time, and in a manner at once simple and sure, caused the last traces of the symptoms of poisoning to disappear. A *post-mortem* examination of the fourth child was not allowed.

The Chemist.

Association of Sulphate of Quinine with Carbonic Acid in the treatment of Marsh Fevers. By Dr. Meirieu.—I have for many years practised in a marshy country, where intermittent fevers are endemic. I

have given quinine in all its forms; but in certain cases, seeing that sulphate of quinine did not answer my purpose, I associated this salt with carbonic aoid, in order to combat with greater advantage, the effects of the marshy infection which are complicated by a spasmodic state of the stomach; in this view, I make a mixture of tartaric acid, sulphate of quinine, bicarbonate of soda and sugar. I have administered this aërated febrifuge powder, while effervescing, in the interval between the fits, after having dissolved it in half a glass of water: the patients take it without repugnance, and the fits ordinarily disappear after two or three doses.

I have observed that sulphate of quinine, rendered soluble by sulphuric, tartaric, or citric acid, acts with great energy, even in a smaller dose, than ordinary sulphate of quinine.

The following are the directions for preparing the powder:—

℞. Tartaric acid	9 grammes.
Sulphate of quinine	10 centigr.

Triturate well and add to the mixture—

Bicarbonate of soda	1 gr. 20 centigr.
Powdered sugar	2 grammes.

For one dose to be taken in half a glass of water, at the moment of effervescence, or else the two mixtures may be separately dissolved in 30 grammes of water, and the solutions mixed and drunk at the moment of effervescence.

The following is the composition of this gaseous febrifuge:—

Sulphate of quinine	10 centigr.
Tartaric acid	4 grammes.
Bicarbonate of soda	5 "
Powdered sugar	30 "
Water	1 litre.

Care must be taken first to introduce the sugar into the bottle, then the quinine dissolved in tartaric acid, and immediately afterwards the bicarbonate; the bottle must immediately be hermetically sealed to prevent the escape of gas. It may be taken in the dose of half a glassful or a glassful every two hours. *Ibid.*

The Metal Didym.—The seventh number of Poggendorff's Journal, contains a notice of the metal which Professor Mosander has recently discovered united with oxide of cerium, in which body he had pre-

viously discovered lanthanium. This metal Professor Mosander has called *didym* (as being the *twin-brother* of lanthanium;) he has not yet discovered any good method of effecting its complete isolation. The oxide of didym imparts to the oxide of cerium its brown color, and also confers on certain salts of yttria, a more or less deep rose-red, or amethyst hue. Pure oxide of cerium and pure oxide of lanthanium are almost colorless. Hydrated oxide of cerium has a sulphur yellow color. Sulphate of didym has a tint intermediate between rose-red and amethyst. When the brown oxide of didym is subjected to a strong red heat, it loses its color and assumes a dirty white appearance. Its density does not, however, seem changed.—*London Pharm. Trans., from Poggendorff's Annalen*, No. 7, 1842.

On Coca and Matico. By Dr. Martius.—Dr. Martius examined a specimen of the noted Coca or Ypada of the Brazils. It is the leaf of the Erythroxylon Coca growing on the other side of the Andes. These leaves are chewed by the native Indians, as we use tobacco, a small pinch is wetted with saliva, and made into a ball with unslaked lime. The Indians who are capable of undergoing great fatigue, will, during the most strenuous exertion, subsist on one or two spoonfuls of maize flour mixed with water, daily, and their coca. The use of this plant has become as much an abuse amongst them, as opium-smoking in China, Its effect is to deaden sensation, and produce even madness; it has, morally, a most pernicious influence on those who take it in excess.

The Matico, or Matica, so highly esteemed in Peru, Dr. Martius believes to be a species of Phlomis. The tree grows in the interior of Peru, also on the other side of the Andes. Its leaves are said to possess marvellous medicinal properties. The preparation for use amongst the Indians is very simple, the leaf is dried and finely powdered, and the dust, sprinkled on wounds, is said to effect cicatrization very speedily. The Indians use an infusion of the fresh leaves as an aphrodisaic, and attribute to them the power of arresting arterial hæmorrhage, even if a large vessel be wounded.

Ibid, from Gauger's Repert., 1842.

On Menyanthin. By Brandes.—The presence of coloring matter, sugar, and organic substances, soluble in alcohol, and the decomposition by heat, are the chief difficulties to contend with in the preparation of menyanthin. The following method will be found to be the most ad-

vantageous:—an alcoholic extract is to be prepared from the juice of the plant by maceration; the spirit is to be distilled off; the aqueous residue to be filtered and fermented with yeast, to remove the sugar; and to each pound of the herb, two ounces of an aqueous solution of oxide of lead are to be added. This will assume a yellow color, and the fluid will appear but slightly yellow, with a greenish tint. Filter; remove the excess of lead; refilter and evaporate, by gentle heat (under 60°,) to the consistence of an extract. This extract is to be covered with alcohol, of ninety-five per cent., and to stand for two or three days; the brownish yellow solution is to be separated, and mixed with animal charcoal, filtered, and the spirit removed by evaporation over sulphuric acid, as distillation causes a discoloration. The yellow, pale, syrup-like mass thus obtained, is easily dissolved in water; and on the addition of more water, a separation of a few oily resinous drops ensues, which are to be removed, and the solution evaporated *in vacuo;* thus a white mass is obtained—partly crystalline, partly amorphous. Menyanthin has a bitter taste, readily becomes brown by heating with an absorption of oxygen, and is decomposed by heat, like all vegetable bitters. It is soluble in alcohol, alcoholic æther, and water, but not in pure æther. An aqueous solution is rendered turbid by alkalies, owing to the presence of salts of lime; it undergoes no change with ammonia, chloride of barium, and acetate of lead. With chloride of tin and tincture of galls it is rendered slightly turbid. With chloride of platina it forms a yellowish precipitate; with the salts of mercury and sulphate of copper a white, and with sulphate of iron a yellowish precipitate; the latter is sulphate of lime. Menyanthin, therefore, forms no combination with metallic oxides. *Ibid, from Arch. der Pharm.*

Benzoic Acid in Elecampane.—Rœttscher has found in a vessel that had contained an alcoholic extract of the Rad. Inulae, also on the cover of the vessel in which it had stood, pointed crystals of benzoic acid.

Ibid.

Preparation of Churrus, or Resinous Extract of Indian Hemp.—In Central India, and the Saugor territory, and in Nipal, *churrus* is collected during the hot season in the following singular manner:—Men, clad in leathern dresses, run through the hemp-fields, brushing through the plant with all possible violence; the soft resin adheres to the leather, and is subsequently scraped off, and kneaded into balls, which sell at

from five to six rupees the seer. A still finer kind, the *momeea* or waxen *churrus*, is collected by the hand in Nipal, and sells for nearly double the price of the ordinary kind. In Nipal, Dr. M'Kinnon informs us, the leathern attire is dispensed with, and the resin is gathered on the skins of naked coolies. In Persia, it is stated by Mirza Abdul Russac, that the *churrus* is prepared by pressing the resinous plant on coarse cloths, and then scraping it from these and melting it in a pot with a little warm water. He considers the *churrus* of Herat as the best and most powerful of all the varieties of the drug.

Ibid, from O'Shaughnessy's Bengal Dispensatory.

Citrate, or Ammonio-Citrate of Iron. By Mr. A. J. Cooley.—Competition in the sale of this article has induced the manufacturer to adopt a cheaper formula than that originally published by Beral, and employed by many houses. It is now frequently prepared by placing together, for some days, in a warm situation, a mixture of iron filings, and citric acid in powder, with barely sufficient water to cover them, occasionally stirring and replacing the water as it evaporates. A saturated solution is made in distilled water, there being previously added more *citric acid*,* if required; it is then neutralised with *liq. ammon. fort.*,† and concentrated by evaporation: the same plan mentioned at page 214, Vol. III., First Series, is followed to complete the process. The first part of this process produces a salt of the protoxide of iron, which is afterwards converted, by the exposure to the atmosphere, into a citrate of the magnetic oxide, and lastly into citrate of peroxide of iron.

The Chemist.

Liquor Ferri Potassio-Citratis. By Dr. John Todd.

℞. Acid. citric. crystallizat., ℥j. ʒv.;
Potassæ carbonatis, ʒvij.;
Ferri sesquioxydi, ℥j.;
Sp. ammoniæ aromat., q. s.;
Aquæ distillat., ℥xxiv.

Dissolve the acid. citric. and potass. carb. in the water; when the effervescence has ceased, add the ferri sesquioxydi, and digest for

* *About* half the weight of the acid first used.

† *About* one ounce and a quarter to every gallon of the solution of a specific gravity of 1.025.

twenty-four hours (frequently stirring) in a gentle heat; filter the liquid, and neutralise any excess of acid by dropping in, gradually, sp. ammon. arom., until it is saturated. The liquid is of a reddish brown color, not precipitated by alkalies, nor altered in color by the ferrocyanide of potassium, or tincture of galls. The taste is slightly styptic, though not unpleasant. It will be seen that there are two equivalents of acid. citric. combined with one equivalent of potassa, and one equivalent of the ferri sesquioxyd.—One drachm of this solution contains five grains of the dry ferri potassio-citras.

An agreeable syrup may be made by dissolving sacchar. alt., lb. j. in f℥xviij. of the solution, and liquifying by a gentle heat. We have thus f℥xviij. of syrup; consequently fʒj. will contain 2.25 grains.—*Ibid.*

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*Ointment for Affections of the Nipples.** By M. Righini.

℞.	Simple ointment	24 grammes.
	White-lead ointment	8 grammes.
	Deutoxide of lead	2 grammes.
	Peroxide of mercury	6 decigr.
	Deutosulphuret of mercury	3 decigr.

F. S. A. an ointment. A small quantity is rubbed with the finger on the diseased nipple.

When the nurse wishes to give suck, she should wash the nipple with slightly alkaline water, then with pure water. *Ibid.*

Five Specimens of Calomel. By Mr. Robert Howard.—*Specimen* 1. Calomel sublimed in glass.—This specimen is crystallised in masses; being parts of the cake formed on the inner surface of the glass receiver. It is perfectly colorless, except at the points of concussion where the cake has been broken.

Specimen 2. Calomel condensed by air.—This is crystalline, and nearly colorless.

Specimen 3. Calomel condensed by air.—This specimen is in the form of powder, but too coarse for medicinal use. It is perfectly white.

Specimen 4. Hydro-sublimed calomel, prepared by Howards and Kent's steam process.—This is in extremely fine powder, and perfectly white.

* Journal de Chimie Medicale.

Specimen 5. Calomel, as usually sold by Messrs. Howards and Kent, and having a slightly yellowish tinge.

Mr. Howard, in a letter which accompanied the specimens, observes, that

"Dr. Gardner's paper illustrates the difference which the mechanical state of a substance may produce in its medicinal effects. It is, however, quite a mistake to suppose that calomel is *necessarily* or *generally* in finer powder when white; it may be, and sometimes is, very coarse, and yet white, as the specimens which I send will serve to show.

"It is a curious fact, that the hydro-calomel, which is in a far more impalpable powder than any other, is objected to by some as not sufficiently active, except in increased doses, four grains being about equal to three, although it has been found to answer extremely well in many cases, more particularly in the diseases of children."

London Pharm. Transactions.

THE

AMERICAN JOURNAL OF PHARMACY.

OCTOBER, 1843.

ART. XXXIX.—A NEW AND EXPEDITIOUS MODE OF PREPARING HYDRARGYRUM CUM CRETA.

By Daniel Stewart, of Baltimore.

Notwithstanding the many difficulties attendant upon the preparation and use of this powder, it preserves its rank among the list of mercurials, after more than one hundred years have tested its comparative value. Indeed, it has recently been classed among three of the most valuable remedies from the long list of preparations of mercury, by one of the most learned and judicious Professors of Materia Medica in our county.* The United States Pharmacopœia, of 1840, retains it among the officinal preparations; but no improvement appears in the formula, although the tedious process indicated by it in order to accomplish the minute division of the mercury, has hitherto made us dependant on England for a large proportion of the article used in this country.

It is generally admitted that the value of this medicine is in proportion to the division of the mercury; but the Pharmacopœia gives no definite rule with regard to the tritura-

* Professor Chew, of the University of Maryland. Note, also, the frequency with which it is prescribed by Sir Charles Bell, in his Institutes of Surgery, particularly in the first part of the book; also the preference that is given to it by Dr. Gooch—Gooch's Midwifery, p. 310.

tion, and consequently the value of the product will depend on the judgment or patience of the operator. Three or four weeks' rubbing is necessary, in order to reduce it to that minute state of subdivision in which the globules will not cohere on the addition of a small portion of tinct. opii, which is frequently prescribed with it.

The cheapness of labor in England, or the use of steam power in their large chemical manufactories, has enabled them to prepare our best samples of Hyd. c. Cret. and blue mass. The foreign mercurial ointment has for some time been excluded from our market, owing to the facility with which mercury is divided, in 15 or 20 minutes, by a small quantity of lard rendered viscid by exposure to the air. It has been ascertained that other viscid substances will accomplish the same object: resinous extracts, for instance. This power, I imagine, depends not only on the separation of the minute globules, but also on the electrical condition which is excited by the friction employed, and being preserved by the resin, renders them repulsive to each other, thus facilitating their further subdivision. Upon this principle, I propose to make use of pure resin in the following formula for Hyd. cum Cret.:

℞. Hydrargyri	℥iij.
Resinæ	℥vj.
Cretæ ppt.	℥v.
Alcoholis	q. s.

Rub the mercury with the resin for three hours; add the chalk, and triturate one hour; transfer the powder to a glass jar; treat it with Oij. alcohol; pour off the solution of resin, and replace it with Oss. of alcohol; repeat the washing until the resin is removed, and dry the powder on bibulous paper; when perfectly dry, mix it intimately in a mortar. Three hours are sufficient to make a preparation in which the globules are not visible with a very powerful lens.

ART. XL.—REMARKS ON SOAP LINIMENT.

By Augustine Duhamel.

(Read at the Pharmaceutical Meeting of the College, May 1, 1843.*)*

In accordance with the observations expressed by me at one of the late Pharmaceutical meetings, in relation to the congelation of the soap in our officinal Camphorated Tincture of Soap, when prepared with rectified alcohol, I submit with the accompanying notice, two specimens for the consideration of my colleagues, with the view to determine the most approved formula.

No. 1.—Is a specimen of soap liniment, made from castile soap and rectified alcohol in strict conformity with the directions of the U.S. Pharmacopœia of the present edition, and which is identical with that of the late edition. It is now about four months since it was made, and is filled with coagulum.

To avoid the danger that might ensue from careless digestion of the soap in alcohol, the practice more generally pursued is that of allowing time to effect a spontaneous solution of the soap.

No. 2.—Is a specimen of liquid opodeldoc, made agreeable to the following directions, and is similar to the one proposed by the Committee of Revision, when occupied with the subject of the Pharmacopœia, with but the slight difference in the proportion of water, which is here diminished. It is made in the readiest manner.

CAMPHORATED TINCTURE OF SOAP.

(Soap Liniment.)

Take of Soap, in shavings,	16 oz.
Camphor,	8 oz.
Oil of rosemary,	2 fl. oz.
Alcohol,	7½ pints.
Water,	½ pint.

Dissolve the soap in the water by heat; then mix with it the alcohol in which the camphor and oil have been previously dissolved: lastly, filter.

ART. XLI.—ON CITRATE OF IRON.

By Lawrence Turnbull.

The Citrate of Iron, an elegant preparation, has recently been introduced into this city, and prescribed by the medical faculty with much success as a tonic. As there are some precautions necessary in making this salt, and some operators having failed in their endeavors to make it, it is believed that the following notice of the process will be acceptable to the readers of the Journal.

Take of Citric acid, 4 oz.
Water, 4 fluid ounces.
Moist hydrated per oxide of iron, a sufficient quantity.

Dissolve the acid in the water, raise its temperature to about 180° Fahr., and gradually add the hydrated peroxide as fast as it is dissolved—by avoiding ebullition the oxide is taken up more rapidly, and does not lose that gelatinous consistence so important to its ready combination with acids.* When the oxide ceases to be dissolved, filter the solution, evaporate it to the consistence of a thick syrup, and spread it on plates of glass, so that when dry the laminæ

* Am. Journ. Pharm., vol. xii. page 190.

will be quite thin. The hydrated per oxide of iron should be prepared according to the formula in the U. S. Pharmacopœia, and should always be prepared for the occasion. When carefully conducted, the above process yields a salt containing about forty per cent. of the ferruginous oxide, suitable for making either powders or pills, and sparingly soluble in cold water. As it is desirable to know how much of the hydrated oxide to prepare in any operation, all that is necessary is to regulate the quantity of proto-sulphate of iron in the formula for hydrated per oxide—thus: every ounce of the proto-sulphate when peroxodized contains 147 grains of *dry* per oxide—now, as the quantity required to combine with four ounces of citric acid is 1440 grs., ten ounces of the sulphate, which will yield 1470 grains, is just about enough.

ART. XLII.—ON PHYTOLACCA DECANDRA.

By Edward Donelly.

(An Inaugural Essay.)

This plant, known by the name of Poke Root and Poke Weed, is found growing abundantly throughout the United States, where it is indigenous, flourishing along road sides, on the borders of fields and woods, attracting attention when in full vigor by the magnitude of its large branching stems, beset with numerous leaves, which are entire, smooth, and of an oblong shape, ribbed beneath, and supported on short foot stalks ; but the beauty of the plant is much heightened by the thickly set clusters of rich dark purple berries,

mingled, as they often are, on the same branch with the white flowers, and green unripe fruit, presenting to the eye of the observer a rich and beautiful display of color. The poke takes its name of Phytolacca from *phyton*, a plant, and *lackka*—gum-lac, from the color of its ripe fruit. It belongs to Decandria, Decagynia, Lin., Phytolacceæ, Lind.

The poke is found growing spontaneously in the northern parts of Africa, and in the south of Europe, supposed to have been introduced from America. The root as brought to the market by the herb collectors, is usually cut into transverse slices of a whitish brown color externally, wrinkled, and exhibiting, on the internal cut surface of the transverse slices, numerous concentric rings, formed by the projecting ends of fibres, between which the internal and more succulent matter has shrunk in drying.

When a new surface has been exposed, these alternate intervening circles are of a light-brown color, whilst the projecting ends of the fibres are of a yellowish white; this slight yellow tinge, observable in a new surface of the fresh dried root, is entirely lost by age, and would be a sufficiently delicate test of the quality of the article, the virtues of which are so much impaired by long keeping. Another distinguishing mark of the freshness of this root is an odor much resembling that of the "Panax quinquefolium," decidedly evident in the recently dried root, but which is entirely lost by age.

Chemical Analysis.

Not having met with any analysis of the root of this plant, the following experiments were gone into with a view of ascertaining its constituents.

Experiment First.—Four hundred grains of the dried root were coarsely powdered and digested in alcohol for several days, then thrown on a displacement filter, and successive portions of alcohol poured on, until it came away

colorless; this tincture was of a light-brown color, and appeared to contain allthe active properties of the root. Concentrated by evaporation, a fixed oil made its appearance on the surface in small globules, which were removed as fast as formed. After the oil was separated, water was added to the tincture, which caused a copious curdy precipitate, which in a few minutes floated on the surface in the flocculent form, leaving the liquid perfectly clear. This was carefully removed and evaporated to dryness in a capsule ; the dry mass was digested in alcohol until entirely dissolved, and then concentrated by evaporation. Tasted in this state it was slightly pungent and extremely nauseous. The odor somewhat resembling that of tobacco. The addition of water to a small portion gave it a milky appearance, and tested with absolute alcohol the same effect was produced; this experiment evidences properties analagous to the gum resins. On evaporating to dryness, a substance of a light-brown color was obtained, possessing the above mentioned properties in a concentrated degree; it weighed ten and a half grains. The clear liquid when concentrated by evaporation had a sweet and mucilaginous taste, accompanied by considerable astringency.

A portion tested with the acetate of the protoxide of lead, threw down a white insoluble precipitate of gum and protoxide of lead. A solution of the sesquisulphate of iron formed a bluish black precipitate, showing the presence of tannin, on which the astringency of the tincture depended. The root thus exhausted, was insipid and inodorous. When dried it weighed 362 grains, showing a loss, besides the ten and a half grains of gum resin, of twenty-one and a half grains of a mixture of gum, tannin, and a small quantity of saccharine matter, and two grains of oil, which last was subsequently found to exist in a like amount of the root. The residue was now boiled in successive portions of water, so long as the aqueous solution of iodine indicated starch; the different portions were added together and concentrated by

evaporation, which the tests showed to consist exclusively of a solution of starch. The root was again dried and weighed, indicating a loss of eighty grains, the residuum weighing 282 grains and consisting of woody fibre or lignin.

Experiment Second.—The two hundred and eighty-two grains remaining from the preceding experiment were incinerated and treated with successive portions of boiling water, until all the soluble matter was taken up. The solution filtered and concentrated by evaporation, was divided into two equal portions, one of which was tested for the soluble salts generally found in the ashes of plants, but none were detected except potassa. The other half of the liquid was evaporated to dryness and yielded six grains of carbonate of potassa, equal to about eight grains of pure potassa in the whole quantity. The residuum weighing seven and a half grains, was now treated with dilute nitric acid; the acid solution filtered, threw down, on the addition of ferrocyanide of potassium, a copious precipitate of ferrocynate of iron. The residuum remaining on the filter when dried weighed four grains, and appeared to be composed entirely of carbonaceous matter, with a minute quantity of silica, showing that the acid had taken up three and a half grains, which the tests proved to be iron.

Experiment Third.—Four hundred grains of the root in coarse powder were digested in sulph. ether for several days, then thrown on a displacement filter and returned several times. Successive portions of ether were then added until it came away colorless. The etherial solution thus obtained had a light straw color. Upon evaporation, it yielded a dark-brown colored oil weighing two grains. This oil is sparingly soluble in alcohol, it combines readily with the alkalies, forming soaps; leaves a greasy stain on paper, and seems to possess all the properties of a fixed oil.

From these experiments it appears that the root of the *Phytolacca decandra* is composed of the following constituents:

Woody fibre, or lignin,	66.5
Starch,	20.
Tannin, gum, and saccharine matter,	5.375
Gum-resin,	2.625
Potassa,	2.
Iron,	.875
Fixed oil,	.5
Silica and carbonaceous matter,	1.
Loss,	1.125
	100.

Medical Properties.

The medical properties of this plant reside in the leaves, berries and root; the two latter are *officinal.* As the active principle abounds most in the root, it is on that account more generally used, and is the only part of the plant kept in the shops. A tincture made of the berries is a favorite remedy of the country people, in some sections, for the cure of rheumatism. Thompson in his Organic Chemistry, says, "The berries of this plant give a beautiful purple color to water of a very positive nature. A few drops of lime water changes it to a yellow, and this yellow liquid is the most delicate test of acids hitherto observed. The smallest quantity of acid restores its purple color. Bracconot, to whom we are indebted for these observations, has shown that it is at least four times as delicate as the infusion of litmus. Unfortunately it alters its nature in a few hours, and then loses its delicacy as a reagent. It can only be used when recently prepared." A tincture of the berries is officinal. Poke root, though seldom prescribed by physicians, is an exceedingly active remedy, operating at once as an emetic, purgative, and narcotic. In very large doses it is said to produce excessive and long continued vomiting, accompanied with purging and symptoms of acro-narcosis. I have known it to produce all the effects of a heavy cold on a person powdering it, accompanied with headache, purging

and much prostration of strength. An ointment, made both from the leaves and powdered root, has been used in the treatment of cutaneous diseases; and an extract, prepared by evaporating the expressed juice of the leaves, had a reputation at one time, as a remedy in the cure of cancer.

REVIEWS.

ART. XLIII.—THE DISPENSATORY OF THE UNITED STATES OF AMERICA. By George B. Wood, M. D., Professor of Materia Medica in the University of Pennsylvania, &c., and Franklin Bache, M. D., Professor of Chemistry in Jefferson Medical College of Philadelphia, &c. Fifth edition, enlarged and carefully revised. 1 vol. 8vo., pp. 1368. Grigg & Elliot, 1843.

During the ten years that have elapsed since the first edition of this work, the exceeding high estimation in which it is held by the medical and pharmaceutical public, has been evinced by the constant demand for it, and the rapid disposal it has met with.

Previous to its appearance, the state of pharmacological knowledge in this country was so impoverished and barren, in consequence of the paucity and meagreness of systematic treatises, which were far behind the age, not only with respect to scientific details, but really important practical discoveries, that, at the time of its publication, the *United States Dispensatory* might almost be regarded in the light of a revelation, and, in conjunction with the valuable auxiliaries, periodical, and others which have since been associated with it, it has contributed to dispel the ignorance, apathy, and indifference that depressed one of the most extensive

and necessary departments of medical science. To institute, however, a comparison between the condition of American pharmacology during two distinctly marked eras that have been under our immediate observation, would be an extended occupation; we wish only to refer to such epochs connected with its history, in noticing a work which is inseparable from the agencies that gave rise to reformation, and which has largely conduced to awaken a taste for the cultivation of the materia medica, and to demonstrate its capabilities. The indefatigable authors have labored assiduously in the field to which they have devoted themselves; and it will be admitted, that it is no disparagement to other meritorious individuals to assert, that they have done more than a mere share to render fertile the waste and unproductive places.

In each succeeding edition of the Dispensatory, the work has been rendered a full compendium of the existing information; improvements and alterations have been introduced, and a jealous vigilance has been exercised with respect to additions and discoveries in science at home and abroad; but it is stated in the preface to this, the fifth edition, that "on no revision have the authors bestowed so much labor as on the present," and the following reasons have been given: The new editions of the United States and Edinburgh Pharmacopœias required comment; and the recent pharmocological treatises of Dr. Pereira and Dr. Christison, containing much original observation, and the Medical Flora of Dr. Lindley, not to speak of other valuable works in different departments of materia medica and pharmacy, afforded a great mass of new materials for selection and arrangement. The periodical press has also presented much that demanded notice, and the changes in the commerce in drugs, and the various modifications in pharmaceutical operations, resulting from increased experience and the advancement of science, called for careful personal examination and inquiry. It appears that the materials have so far increased, that even "by

pruning redundances and concentrating the new matter within the smallest possible space, the authors have been compelled to exceed the former limits by more than one hundred pages."

The method and arrangement of the United States Dispensatory are too familiar to require *their being detailed;* the same divisions have been introduced into this as in former revisions. The changes that have been made consist of new information with regard to the articles of the materia medica, with additional accounts of medicinal substances; the improvements which preparations have undergone in their modes of formation; an exposition of such as have been recently introduced; and, lastly, the improvements in pharmaceutical processes.

It would be impossible, except in an elaborate analysis, to present all the particulars in which alteration is apparent, as this would occupy more space than we can allot to them. We shall, therefore, have to restrict our attention to such as are most striking and important. To facilitate our endeavor, we shall present the articles of the materia medica as they are afforded by the three kingdoms of Nature, taking up first those of the *vegetable.*

Aloe.—Upon the authority of Lindley's *Flora Medica,* it is stated that the *A. purpurascens, A. arborescens, A. commelyni,* and *A. multiformis,* all natives of the Cape of Good Hope, yield the product in addition to the species to which it has hitherto been referred. The three species that are particularly described are, the *A. spicata,* the one assumed as officinal by the U. S. and London Pharmacopœias, the *A. socotrina,* and *A. vulgaris.* The Cape aloes is "collected by the Hottentots and Dutch boors, indiscriminately from the A. spicata and other species which grow wild in great abundance. The process is very simple. According to the account of Hallbeck, a Moravian missionary, who resided at the Cape, a hole is made in the ground, in which a sheep skin is spread with the smooth side in-

ward. The leaves are then cut off near to the stem, and arranged around the hole, so that the juice which runs out may be received into the skin. The juice flows most freely in hot weather. (Un. Breth. Mission Intelligencer, N. Y., vol. vi. p. 436.)" "The finest kind is collected at the Missionary Institution at Bethelsdorp, and hence called *Bethelsdorp aloes.* Its superiority is owing exclusively to the greater care observed in conducting the evaporation, and in avoiding the intermixture of earth, stones, and other impurities. (Dunsterville, in Pereira's Mat. Med.)"

In the case of socotrine aloes, it is stated, that "we have been able to discover no good reason for depriving the *A. socotrina* of the honor formerly conceded to it, of producing this variety of aloes. If the species under this name, which is described in *Lamark's Encyc.*, and in *Curtis' Mag.*, where it is also figured, as well as in the *Plantes Grasses* of Decandolle, be the product of Socotora, it must be conceded to be the true plant, Ainslie's authority to the contrary notwithstanding." This kind has been brought direct to this country. By the ship *Sultanee,* from Muscat, despatched by the Imaum, several qualities of the drug were introduced—the finest corresponding to the description given in the work; the coarsest, dark-colored, dull, dirty, and, when dry, very friable, answering to the account of hepatic aloes. This circumstance favors the opinion, that the East Indian hepatic and socotrine are derived from the same source.

Catechu.—No difficulty in correctly attributing the varieties of drugs to their correct sources has been greater than that connected with the determination of astringent substances. Of this, catechu may be cited as an example. Beside *Acacia catechu,* several other plants are now described as yielding different kinds of it. The varieties are presented in the Dispensatory as officinal and non-officinal. To the first belong—1. *Plano-convex catechu, (Cake catechu,)* of which it is said, that "it is common at present in

our market, but we have been unable to trace its origin accurately. There can be little doubt, from its internal character, that it comes from the East Indies, and is the product of *A. catechu ;* but no accounts that we have seen, of the preparation of the drug in particular geographical sites, indicate this particular shape; and it is not impossible that portions of it may be formed out of other varieties of catechu by a new solution and evaporation." 2. *Pegu catechu.* This is stated to be derived from Burmah. "It enters commerce, probably, in general, through Calcutta, in large masses, sometimes of a hundred weight, consisting of layers of flat cakes, each wrapped in leaves, said to be those of the *Nauclea Brunonis.* In this form, however, we do not see it in the shops; but almost always in angular, irregular fragments, in which portions of two layers sometimes cohere, with leaves between them, indicating their origin. It is characterized by its compactness, its shining fracture, and its blackish-brown, or dark, Port wine color, so that when finely broken, it bears no inconsiderable resemblance to kino." 3. *Catechu in quadrangular cakes.*—We are told that "this is scarcely ever found in the shops in its complete form, and the fragments are often such that it would be impossible to infer from them the original shape of the cake. This is usually between two and three inches in length and breadth, and somewhat less in thickness; of a rusty brown color externally, and dark brown, or brownish-gray, within, with a somewhat rough and dull fracture, but when broken across the layers in which it is sometimes disposed, exhibiting a smoother and more shining surface." "There is little doubt that this variety comes from the provinces of Bahar and Northern India, where the preparation of the drug was witnessed by Mr. Kerr and Dr. Boyle, who both speak of it as being cut, when drying, into the quadrangular form. It has been called *Bengal catechu,* because exported from that province." 4. *Catechu in Balls.*—This occurs in two forms: "the one consisting of globular balls, about as large

as an orange, very hard and heavy; of a ferruginous aspect externally; very rough when broken, and so full of sand as to be gritty under the teeth; the other in cakes, originally, in all probability, globular, and of about the same dimensions, but flattened, and otherwise pressed out of shape before being perfectly dried; sometimes adhering two together, as happens with the lumps of Smyrna opium, and closely resembling, in external and internal color, and in the character of their fracture, the quadrangular variety." "The former kind is rare, and the specimens we have seen had been twenty years in the shop, and had very much the appearance of a factitious product. The latter is, in all probability, the kind known as Bombay catechu, as Dr. Hamilton, and, more recently, Major Mackintosh, in describing the mode of preparing catechu on the Malabar coast, of which Bombay is the entrepôt, say, that while the extract is soft, it is shaped into balls about the size of an orange."

To the second class, viz., *non-officinal*, belong, 1, *Gambir, Terra Japonica.* The plant which affords this product is the *Uncaria gambir* of Roxburgh and Decandolle, formerly known as *Nauclea gambir.* Formerly, the East Indian kino was attributed to this plant, which has now been corrected, and the substance which it yields placed among the varieties of catechu. A peculiar white proximate principle found in it is called *catechuin,* or catechuic acid. 2. *Areca catechu.*

Cinchona.—The botanical account of this valuable drug is somewhat altered from that of the last edition. This has been done in consequence of the information presented by Prof. Lindley, from close investigation of the materials for comparison and study. The author of the article on this subject years since distinguished himself by laborious devotion to it, and the learned essays resulting from his inquiries constituted a repository from which even skilful pharmacologists could obtain valuable truths. Well able, then, has he been to appreciate the additions of another. For the de-

scription of the species, however, we must refer to the book. We notice that greater precision has been adopted in describing the varieties of bark, and, under the head of Carthagena, these are presented in detail. Such as are denominated *false* are likewise more particularly specified. The whole subject of Quinology contained in the work is worthy of attentive perusal.

Kino.—As assumed by the U. S. Pharmacopœia, this is stated to be "An extract obtained from an uncertain plant," although under the head of each variety the source is discussed. The *East India*, or *Amboyna Kino*, was for a time supposed to be the product of the *Nauclea gambir*, now the *Uncaria gambir.* This, however, has been determined to yield a variety of catechu, (see remarks on this subject.) The origin of the drug is not known precisely, as we are informed by the following quotation: "The name of Amboyna kino would seem to imply that it comes in part, at least, from that island. But Pereira states, that all the importations he could trace were from Bombay and Tillicherry, and he therefore conjectures that it is collected on the Malabar coast. Roxburgh suggests that it may be derived from the *Pterocarpus marsupium*, an East Indian tree, the juice of which is strongly and simply astringent, and hardens into a dark, very red, brittle mass, which assumes a lighter color when powdered. (Lindley's Flor. Med., p. 256.)"

West India, or Jamaica kino, which is believed to be the product of the *Coccaloba uvifera*, is brought into the market in gourds. From a specimen, which came into the market as authentic, it is thus described: "When taken from the gourd, it breaks into fragments of various sizes, upon an average about as large as a hazel nut, and having some tendency to the rectangular form. The consistence of these fragments is uniform; their surface smooth and shining, and their color a dark reddish-brown, approaching to black. They are, however, not so glistening, nor so

black, as the East India kino. In mass they are quite opaque, but in their splinters are translucent, and of a ruby redness. They are readily broken by the fingers into smaller fragments, are easily pulverized, and yield a dull reddish powder, considerably lighter colored than that of the former variety. The West India kino is without odor, and has a very astringent, bitterish taste, with a scarcely observable sweetish after-taste. It adheres to the teeth when chewed, though rather less than the East India variety, and colors the saliva red." An article named *South American*, or *Caracas kino*, is described; it has a close resemblance to the preceding, and is common in our market. We coincide in opinion with the authors, that it is a variety of the West India, derived from a like source, but a rougher article. The *African* and *Botany Bay kino* are described as they are noticed by European authorities; it appears that no new light has been thrown upon them. To determine, accurately, the natural history of the different species of this drug, would be a labor of great interest to science.

Prunus Virginiana.—Our readers may not be aware that this name is now used merely in a pharmaceutic sense, indicating the *Wild Cherry Bark*, and does not apply to the plant from which it is obtained. It appears that *Prunus Virginiana* was the designation given by Linnæus to the *Choke Cherry*, but was supposed by Michaux to mean the *Wild Cherry*, from whom originated a mistake which has subsequently been perpetuated. He changed the generic name, under this impression, from Prunus to Cerasus, and called, as he supposed correctly, the *Wild Cherry*, *Cerasus Virginiana*, and the *Choke Cherry*, *Cerasus serotina.* Decandolle has pointed out this error, and reversed the employment of the terms, so that the anomaly in pharmaceutic nomenclature now presents itself, of calling a drug by a synonyme of one plant, while, in the same line, almost, it is stated to be procured from another. This will have ultiamtely to be changed, as the only difficulty to be overcome

is habit. For the botanical account of the species, the Flora of North America may be consulted.

Sarsaparilla.—In addition to the three species described in the last edition, a fourth is at present noticed, called *Smilax medica.* The old species, *S. sarsaparilla,* is our own plant, and as it is known, at least by American pharmacologists, not to afford the drug, it ought to be given up. The *Brazillian,* or, as it is called, *Para sarsaparilla,* is more particularly described. It, of late, has come into our markets, and is less scarce than formerly.

Senna.—We do not perceive that any new information has been presented with respect to the plants affording this drug. Several years ago, we advocated the idea, in this Journal, that the *Cassia lanceolata* of Forskal and Nectoux, and *C. acutifola* of Delile, were varieties of the same plant. Independent of other considerations, which were presented at length, our faith in the opinion was supported by the views of Decandolle. Lindley, however, regards them now as distinct. The Tripoli senna is referred to the *C. Æthe-opica* of Guibourt, which is the same as *C. ovata* of Merat.

We shall here close our remarks upon the vegetable products. With respect to animal substances, we perceive no alterations worthy of record. The additions that have been made to the articles of inorganic origin, are such as the advance in chemical discovery rendered necessary.

Acidum arseniosum.—The subject of the antidote to this virulent poison is more elaborately and precisely treated of than it was in the last edition. The rationale of its operation is thus given: "The antidote acts by producing with the poison, by a transfer of oxygen from the oxide to the acid, an insoluble, and therefore inert, sub-arseniate of protoxide of iron, ($4FeO + As_2O_5$)." Under this head, the full importance of our able collaborator, Mr. W. Procter's, experiments has been set forth.

Ammoniæ murias.—The description of the process for preparing this compound is changed, and that pursued by

the English chemical manufacturers presented. In this is exhibited the advantage and facility of applying the useless products of one manufactory to the purposes of another; the materials from which it is fabricated being *gas liquor* and *bone spirit*—the first afforded by gas works, the latter by ivory-black establishments.

Magnesiæ carbonas.—"Two kinds of Carbonate of Magnesia are distinguished; the light and the heavy. The light carbonate is the kind manufactured in Scotland. The heavy, according to Dr. Pereira, may be manufactured as follows: Add one volume of a cold saturated solution of carbonate of soda to a boiling mixture of one volume of a saturated solution of sulphate of magnesia, and three volumes of water. Boil until effervescence has ceased, constantly stirring with a spatula. Then dilute with boiling water; set aside; pour off the supernatent liquor, and wash the precipitate with hot water on a linen cloth; afterwards dry it by heat in an iron pot."

In the part devoted to preparations, which constitutes the second portion of the work, much new matter has been introduced, and such alterations made as have been rendered necessary by the advance in our pharmaceutic knowledge.

Under the head of Acetic Acid, is given a more detailed account of the mode of production and comparative strength of the different officinal products; and the specific gravities are presented in a tabular form. *Hydrocyanic acid, Oil of wine, Nitrous ether, Sweet spirit of nitre,* as well as many others, are more satisfactorily treated of. Several new medicines have been introduced into the appendix, as belonging to the non-officinal list. The article upon displacement has been extended, and such specifications made of the method as to render it available in pharmaceutic operations. We must forbear, however, from entering into further particulars, and terminate a notice which has extended much beyond the limits contemplated when it was commenced. If the good that has been effected by the United Stated Dis-

pensatory is an earnest of the future beneficial influence it will exert, we cordially welcome its reappearance, and doubt not that its success will fully equal its exalted merits. J. C.

ART. XLIV. — CHEMISTRY, IN ITS APPLICATION TO AGRICULTURE AND PHYSIOLOGY. By Justus Liebig, M.D., &c., Professor of Chemistry in the University of Giessen, &c., and ANIMAL CHEMISTRY, OR ORGANIC CHEMISTRY, IN ITS APPLICATION TO PHYSIOLOGY AND PATHOLOGY. By Justus Liebig, M. D., &c., Professor of Chemistry in the University of Giessen, &c. 8vo. James Campbell & Co. 1843.

Although it is within but a few years that the department of Organic Chemistry has commenced to acquire importance, so rapid has been its progress, that, at the present time, it enrols on the list of its devoted cultivators names of many eminent for talent and industry. Among these the author of the above treatises stands pre-eminent. Appointed by the chemical section of the British Association for the advancement of Science, to report on the state of Organic Chemistry and its applications, he has undertaken to fulfil the task in three parts, two of which are now before us. We will endeavor to place before our readers a condensed abstract of the views contained in these reports, but for most of the details we must refer to the works themselves.

The ultimate constituents of organized bodies are carbon, hydrogen, oxygen, and nitrogen, together with a few other elements not so essential to their formation. Agreeing in ultimate constitution, animal and vegetable structure, however, differ essentially as to their source of nutrition, and the forces by which this process is sustained. In both there is recognized a force whose natural state is rest, but which,

by external influences, is disturbed, and, as a consequence of motion thus effected, produces structural form. To this the name of *vital force*, or *vitality*, is applied. The influences, however, by which this force is disturbed, and the instruments by which it acts, are very different. Vegetables require for their nourishment matters reduced to their inorganic state as the result of decomposition ; but animals can only derive nourishment from highly organised particles. In the former the state of rest is disturbed by the influences of air, moisture, and light, while to the mere vegetative life there is superadded, in the latter, faculties of sensation and motion, acting through a nervous organism. These wide differences require a separate consideration.

For the growth and reproduction of vegetable structure, the elements which constitute that structure must be present in the source of nourishment. To the soil upon which they rest is the most natural source to which to look for this supply; and great importance has been attached to their composition. To the matter recognized as the source of fertility the name *humus* has been applied, and the opinion advanced that this substance is extracted by the roots of plants, and serves to the production of their tissues. This opinion the author considers as untenable. Humus does not appear capable of solution and consequent absorption by plants, unless previously acted on by alkalies, and converted into the so-called humic acid; and even under the most favorable circumstances, the amount of alkali, even with the oxides of iron and manganese in the soil, is not by any means sufficient to render soluble in the form of humic acid the quantity of carbon which exists in the vegetable structure in any given space. This is shown by an estimation of the amount of carbon annually produced on one acre of woodland in comparison with the metallic oxides present, these latter being capable of conveying sufficient carbon to form only 100 pounds of dry wood—but one-thirtieth of the actual amount produced. Carbon may also be conveyed away

under the form of vegetable structure from the surface of any given soil, and yet the quantity of humus so far from decreasing, has increased in amount. This position is sustained by a series of arguments and calculations confirmatory of this fact. Humus, moreover, is not necessary to some plants, which will live and flourish separate from any soil; aud there must have existed a period in the first formation of all soils, when no humus could have been present, this susbtance being the result of decay of previously existing vegetable structure. Whence, then, is the source of this element? The only other source is the atmosphere. An examination of the air results in the determination that, besides its main constituents, it contains a small but invariable amount (1-1000 part of its bulk) of carbonic acid. Small as is this proportion to the whole amount, yet by "calculation it can be shown that the atmosphere contains 3306 billion pounds of carbon;" "more than adequate to all the purposes for which it is required." Carbonic acid, existing in the atmosphere to this amount, is always in contact with the leaves of the plants, and, from its solubility, is carried down and conveyed to their roots by the rain. By experiment, it has been determined that when living vegetables, surrounded by an atmosphere of carbonic acid, or immersed in a solution of this gas, are placed under the influence of the sun's light, either direct or diffused, the carbonic acid disappears, and is replaced by pure oxygen; but, in the absence of light, this effect ceases, and, on the contrary, carbonic acid is given out. This latter fact has been adduced as disproving the decomposition of carbonic acid. To understand properly this difference of result, it is necessary to separate the vital action from a decomposition of a purely chemical nature. It is only when the static force of vitality is affected by the external influence of light, that this action is produced; but place the plant under other circumstances, in which the action is merely chemical, and the result is very different. If a dead or living plant be sub-

jected to the action of oxygen in the dark, then the chemical affinity of the inorganic elements are brought into action, —leaves change their color, oils become resins, and various other changes take place, such as usually result from the chemical action of oxygen. The oxygen disappears during night, from entering into combination with portions of the organized structure, and the carbonic acid thrown off is that which has been absorbed by the unceasing action of the roots, and not being subjected to the proper influence, can not be assimilated by the plant.

Experiments have been instituted to prove that carbonic acid is not sufficient for the nourishment and perfection of vegetable structure. But the only conclusion to be derived from them is, that other substances are also essential to this result, or that perfection of vegetable structure cannot be obtained without all the elements which are necessary to its composition,—grass cannot be formed without silex,—grain without phosphate of magnesia, &c.

Although the carbon of the vegetable structure is derived from carbonic acid of the atmosphere, yet humus still acts an important part in the vegetable economy. This substance is not a constant and definite compound, but, on the contrary, is matter in a state of transition. "Woody fibre in the state of decay is called *humus*." All woody fibre when exposed to the action of oxygen yields carbon, which undergoes a very slow combustion, and carbonic acid is produced. To effect this, moisture is necessary, and alkalies accelerate it, while acids produce a contrary effect. The carbonic acid in solution is absorbed by the roots, and this supply, though small, is most essential at that period in the year when the plants are destitute of those organs (leaves) which are capable of drawing their nourishment from the atmosphere.—Also, the young plant, before it protrudes from the ground, is surrounded by it, and also derives its support partly from this source, before its organs have arrived at maturity. The effect of culture is to hasten the slow combustion of the

woody fibre, by allowing a more free access of oxygen of the air.

Hydrogen and oxygen also enter into the composition of vegetables. Pure woody fibre contains these elements in the proportion to form water; but other parts may contain one of these elements in a greater or lesser proportion. The source of these elements is obviously supplied by the decomposition of water, and a greater or lesser amount of each element is assimilated according to the compound formed.

Nitrogen exists in many vegetable compounds, and the source of its supply is an important point. Plants will grow in pure charcoal if moistened with rain water; rain water can only contain nitrogen as dissolved atmospheric air, or in the form of ammonia, but nitrogen, when uncombined, is a remarkably indifferent substance, while its combinations are capable of ready transformation. Experiments have placed beyond doubt the existence of ammonia in the atmospheric air; for it has been detected in rain water and in snow. The sources from which it is derived are fully pointed out, but our space will not admit of detail, and the inferences drawn from this important discovery can only be properly appreciated by a perusal of the author's remarks.

These four elements constitute the principal amount of vegetable matter, but other substances are equally necessary in the formation of special organs; viz., their inorganic constituents. These have been supposed to be only accidentally present, being taken up by the plants because existing in the soil, and that they exercise no peculiar influence on the growth. Analyses of the ashes of the same kind of vegetable productions, grown on different soil, in which unequal amounts of the metallic bases were obtained, are adduced in proof of this. But "it must be considered as a most remarkable accident, that these same analyses furnish proof for the very opposite opinion." These bases exist in the form of salts, and when the amount of the different metallic oxides

present are compared, not by actual weight, but by the relative or proportional weight and saturating power, it results that the amount of acids necessary to saturate the bases would be the same in all. When one metallic oxide is deficient, its place is supplied by another; not in the same actual weight, but in the precise amount indicated by its chemical equivalent. The quantity of acid present, and which is generally organic, would seem to regulate the supply of the inorganic base; but the extent to which this substitution of one base for another may take place, has not been sufficiently ascertained. It is only known that, in some cases, lime or magnesia may, to a certain extent, replace potassa; and that some of these may be replaced by an organic base: while, on the other hand, the organic acid may occasionally be replaced by an inorganic acid. Certain bases are, however, known to be indispensable, as potassa to vines; and in every instance where any essential organ contains an invariable saline constituent, either that or its elements must be supplied. These views are supported by example and argument confirmatory of the position.

We must pass over the chapters on the Art of Culture and Rotation of Crops with very few remarks. All the soil on the earth's surface was derived, originally, from the disintegration of rocks. In their solid or unbroken state they yield very slowly any of their constituents to the action of acids, but the slow and continued action of carbonic acid and moisture, on those containing alkalies, gradually decomposes them, and dissolves the alkaline carbonate. By these agencies, and the action of change of temperature, disintegration takes place, and the soil is formed capable of yielding its constituents to plants. The soluble matter will gradually be abstracted, and the soil becoming exhausted, temporary sterility will be produced. As the disintegration goes on, the soil regains its fertility. In this lies the secret of the success attending the cultivation of a succession of different crops on the same soil. A crop which abstracts potassa largely

from the soil, will soon cease to flourish when the supply becomes deficient, and another crop, requiring less or none of this element, will flourish on the same soil. If the field be allowed to produce weeds, which will return to the soil, by decay, all that they have taken up, or if plants are produced which do not abstract the alkalies, then the result of the slow disintegration of the soil again produces fertility by rendering the alkalies soluble. In connection with this point, it is to be considered that experiments have positively proven that roots expel those matters which the plant is not capable of assimilating, and the accumulation of these secretions ultimately proves injurious to the kind by which they have been secreted. These excrements, by gradual decomposition, become converted into humus, and cease to be hurtful, and even before decomposition may not be deleterious to plants of a different nature.

Very important observations follow on the character, formation, and operation of manures, and their peculiar value, together with extensive analyses of soil from different parts, for which we must refer to the work itself, and pass to the consideration of the second part, or the Application of Organic Chemistry to Physiology and Pathology.

"In order to keep up the phenomena of life in animals, certain matters are required—parts of organisms, which we call nourishment. In consequence of a series of alterations, they serve either for the increase of the mass *(nutrition,)* or the supply of the matter consumed *(reproduction,)* or, finally, for the production of force."

The author considers that the state of rest is determined by the force of chemical affinity operating to effect combination, and the subsequent motion, the result of a series of changes produced by the decomposition of the food itself, or the organs formed from it. In support of this opinion, the continued action of the oxygen of the atmospheric air first attracts his attention. The amount of this element, which is abstracted from the air by the lungs of a healthy

adult, is estimated by different authors at from 746 to 837 pounds in a year; yet the increase, or variation of weight, in an individual amounts only to a few pounds. What, then, has become of this large amount of matter? An examination of the products given out from the body during the same period, affords a satisfactory elucidation of this question. Carbonic acid and water, both requiring oxygen for their formation, are constantly separated from the system, and in amounts proportionate to the oxygen which disappears. For, "if we assume, with Lavoisier and Seuguin, in order to obtain a foundation for our calculation, that an adult man receives into his system, daily, 32.5 oz. of oxygen, and that the weight of the whole mass of his blood, of which 80 per cent. is water, is 24 lbs.: it then appears, from the known composition of the blood, that, in order to convert the whole of its carbon and hydrogen into carbonic acid and water, 64.103 grs. of oxygen will be required. This quantity will be taken into the system of an adult in four days and five hours."

It has been determined, by observation, that an adult consumes the average daily amount of 13.9 oz. of carbon, after deducting from the whole amount of ingesta that portion which passes off as the refuse of the system, and in the form of secretions unaffected by the absorbed oxygen. The whole of this must escape from the lungs as carbonic acid, requiring, to effect this, 37. oz. of oxygen. The oxygen taken into the system is found in no other form or combination than with carbon or hydrogen; and, as the carbon and hydrogen carried off is replaced by the same elements from the food, a direct ratio is immediately established between the amount of oxygen respired and the food consumed. This is illustrated by the fact, that those circumstances, either natural or artificial, which cause a variation in the number of respirations, also produce a difference in the amount of ingesta necessary for the support of the vital action, of which

several examples are adduced, derived from youth and age, labor and rest, and difference of climate.

As one of the incidental results of the combination of carbon and hydrogen, the temperature of body, or animal heat, is to be considered. Here it is to be noticed, that those parts, only, which are supplied with arterial blood (or that which has absorbed oxygen) possess a temperature superior to the surrounding medium. As we find out of the body, that carbon cannot unite with oxygen without producing an elevation of temperature, and that from a definite weight, the amount of caloric is the same, whatever may be the time consumed in the effecting the combination, so the same cause in the body must produce similar results: and thus, in the slow combustion of the carbon and hydrogen of the food, or of the organism, we have the source of animal heat. If this be the fact, then those circumstances which influence the consumption of oxygen, will also influence the animal temperature, and this is found to agree with observation. Animals of quick respiration, and who require a large amount of oxygen, belong to the class of warm blooded animals, and possess an elevated temperature; while those which require but little oxygen, (as fish, which only obtain it from the air contained in water,) possess a temperature but little above the medium in which they live.

In man, the temperature of the adult is uniform in every region of the globe. How does this correspond with the amount of oxygen respired, and of carbon received by the system ? In the warmer regions of the globe, the natural instinct leads to food deficient in carbon, and the atmosphere expanded by heat, does not afford as large a supply of oxygen; while, in the colder, the contrary is exhibited, and that food is preferred which affords a large proportion of carbon, and the increased density of the atmosphere at the same time supplies more oxygen for its combustion—with the consequent elimination of a greater abundance of caloric to supply that abstracted by the lower temperature of the

surrounding air. The habits and manners of different nations also afford proof to the same effect. In civilized nations the loss of heat is prevented by the use of clothing, not allowing ready escape for caloric, but in many barbarous nations no such protection is used, and this with the active exertions of hunting, requiring a greater amount of caloric, they are able and do consume a proportionally greater amount of food, and that also of an animal nature. In starvation, and in hybernating animals, the organs themselves supply the matter to be consumed, and which is not replaced by the nutritive process. All the oxygen which enters the system daily, is given out again in combination with part of the body; and death results with greater or less rapidity, in proportion to the bulk of the individual, the exertion used, and the temperature of the surrounding medium.

These observations lead to very important and interesting views, as to the operation of external agents in health and disease, of which our space will not permit the notice.

In the nutritive process, it must be conceded, that the blood is the all-important agent in supplying the means of increase, development, and waste. It is, then, to the composition and ingredients of this fluid that we must look to determine what substances are nutritious, or capable of conversion into blood.

The most important ingredients of this fluid are *albumen* and *fibrine.* Chemical analysis of these bodies leads to the remarkable fact, that they are identical in composition; containing, notwithstanding their dissimilar physical properties, the same elements, and in the same proportion. They also agree in some of their chemical reactions, and fibrine has even been converted into albumen by chemical agents. From this identity, there is no difficulty in conceiving the conversion of blood into muscular fibre, and muscular fibre into blood. All the other parts of the animal structure contain the same elements which are to be found in blood. They all contain

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17 per cent., at least, of nitrogen, together with carbon, hydrogen, and oxygen; and in some are found, more especially, the inorganic elements contained likewise in blood, iron, lime, phosphorus, magnesia, &c.

Such being the composition of the blood, and its ready formation from organized animal structure, this structure will then afford the materials most readily assimilated, and, in carniverous animals, the function of digestion will be exhibited in the most simple form. Organized structure, derived originally from blood, becomes dissolved in the stomach, and, in the course of its transmission through the system, becomes again blood, to be again transformed into organized structure.

But, in gramnivorous animals, this process is not so evident. Food, apparently very distinct in its character, is here assimilated and undergoes the same changes. Chemical research explains with satisfaction this result. Vegetable matter is found to contain the same ultimate elements as animal organism, and, what is much more remarkable, combined to form certain proximate ingredients, which not only possess similar chemical characters with albumen and fibrine, but, by analysis, are proved to be identical in composition. These nitrogenized constituents of vegetable food are, vegetable albumen, fibrine, and casein. They are identical in properties with the chief constituents of blood, and the identity among all extends to their ultimate composition, so that no difference in their elementary formation can be observed. This similarity in composition can even be traced to a still greater extent. According to the observations of Mulder, all these nitrogenized compounds, whether vegetable or animal, yield, under the action of a solution of caustic potassa and heat, a solution from which acetic acid precipitates a gelatinous substance, (proteine,) in all cases identical. In ultimate composition, proteine differs from all the tissues by containing an additional amount of oxygen and hydrogen, to which, also, in some degree, phosphorus, sulphur, and ni-

trogen are superadded; or, in other words, proteine only requires the addition of these elements to constitute any elementary tissue.

"How beautiful and admirably simple, (exclaims the author,) with the aid of these discoveries, appears the process of nutrition in animals, the formation of their organs, in which vitality resides!"

These substances all contain nitrogen; but other substances, which do not contain this element, appear essential to the well-being of a certain class of animals; these are, sugar, starch, gum, &c. These three substances are nearly similar; all consisting of the same amount of carbon, united with different amounts of hydrogen and oxygen, with proportions to form water.

The author considers that it is the carbon alone which here acts an efficient part in the animal economy, and that it is destined to supply, in gramnivorous animals, that element essential to the production of heat, and which would otherwise be insufficient, as the amount of carbon taken in with the food would be incapable of producing, with the oxygen, the quantity of carbonic acid which is thrown off, in addition to that which is present in the secretions. These views are supported by a well-chosen series of arguments, in which the process of conversion is traced in all its details.

It is to the substances destitute of nitrogen that our author looks for the formation of fat,—a substance in the animal structure destitute of nitrogen, and without traces of organization. These substances being required to supply carbon, which, by its combination with oxygen, forms the expired carbonic acid, let us look to the result of continuing their supply, and diminishing its necessity. An illustration is drawn from the stall-fed animal: it eats, and reposes merely for digestion. Without exercise, and protected from cold it absorbs less oxygen, and, consequently, less carbonic acid is produced. The excess of carbon must be appropriated to

some other purpose, and this other is the formation of fat. This is evinced in the feeding of animals on substances containing nitrogen. They do not become fat, although their bulk is increased by the expansion of the organic tissues; whereas, in corn-fed animals, the nitrogen being deficient, the fat is formed in excess. An examination of the composition of fatty bodies will show how this may take place. Gum, sugar, &c., and fats, differ in composition, principally in regard to the amount of oxygen; the carbon and hydrogen being in nearly the same ratio in all. This being the case, to convert starch, &c., into fat it is only necessary to abstract oxygen, together with a small amount of carbon. Here, then, the deficiency in absorption of atmospheric oxygen, gives rise to the abstraction of oxygen from the food, and the subsequent conversion of the food, or of the organism itself, into principles deficient in that element.

It follows, from these views, that the food of man "may be divided into two classes: into *nitrogenized* and *non-nitrogenized.*" "The former may be called the *plastic elements of nutrition;* the latter, *elements of respiration.*" Among the former, are vegetable albumen, fibrine, and caseine, with animal flesh and blood. Among the latter, fat, starch, gum, sugar, pectin, bassorin, alcoholic and fermented liquors.

The remainder of the work is devoted to an examination of the chemical processes engaged in the production of the secretions, bile, urine, &c., and the nervous organism, accompanied by copious analyses and calculations; and in speculations on the laws of the phenomena of motion, together with the theory of disease and respiration. These we are compelled to pass over; and, in concluding would remark, that the terse and sententious nature of the author's style, creates an appearance of obscurity, requiring very close attention, in some parts, to ascertain the true meaning.

R. B.

ART. XLV.—ELEMENTS OF CHEMISTRY, INCLUDING THE APPLICATIONS OF THE SCIENCE IN THE ARTS. With Numerous Illustrations. By THOMAS GRAHAM, F. R. S., Lond. and Ed. Professor of Chemistry in University College, London, &c. With Notes and Additions, by ROBERT BRIDGES, M. D., Professor of General and Pharmaceutic Chemistry in the Philadelphia College of Pharmacy, &c. Philadelphia: Lea & Blanchard. 1843.

THE student of Chemistry, in this country, cannot but be gratified by the issue of an American edition of Graham's Elements by its enterprising publishers, which places at his disposal another excellent exposition of chemical science, and one which is at least equal to any other work on the same subject in the English language.

Part first contains the fundamental doctrines of the science, and embraces, "under the heads of Combining Proportions, Atomic Theory, Doctrine of Volumes, Isomorphism, Isomerism, Constitution of Salts and Chemical Affinity," a mass of valuable information. The author's views of classification, which have been adopted by Kane, are also stated at length in this part of the work.

Part second contains a description of the non-metallic and metallic elements, together with their binary compounds and salts. This portion of the work, while it is amply comprehensive in detail for the purposes of a text book, embraces a more extended view of those substances of importance in the arts, as Sulphuric Acid, Iodine, Carbonate of Soda, Chloride of Lime, etc.; and of the practice of alkalimetry and chlorimetry.

The author has placed the description of the salts of each metal, immediately following that of its binary compounds, which presents the whole subject at one view, and facilitates reference.

Part third treats of Organic Chemistry. A condensed account of organic analysis, the doctrine of substitutions of

Dumas, the action of ferments, and the molecular theory of organic compounds, are embraced in a preliminary section; Liebig's method of arrangement under compound radicals has been adopted, which gives greater unity to the subject, and facilitates its study. This part of the work contains much that is new in animal chemistry, and "important conclusions respecting the functions of digestion and respiration, results which are entirely new, and now enter, for the first time, into a systematic work on chemistry."

Under the supervision of its able editor, the text has undergone a careful correction, and, in the form of notes, several important observations, made subsequently to its publication, have been appended. The work contains one hundred and thirty-three illustrations, and, in fine, constitutes a most valuable addition to our chemical literature.

W. P.

ART. XLVI.—ON THE NAPTHA OF DR. HASTINGS.

Dr. Hastings, of England, has recently published statements in relation to the use of Naptha in Phthisis, and as there has been a difficulty in understanding what substance was alluded to, the editor of the London Pharmaceutical Journal has given some judicious remarks in the July number of that periodical. After noticing Naptha proper, pyroxylic spirit, etc., Mr. Bell observes, "Another volatile and inflammable fluid closely resembling, and indeed not easily distinguished from the last described, in its physical characters, is obtained by the destructive distillation of an acetate, as the acetate of lead or lime. This product has been called by chemists, pyroacetic spirit, mesitic alcohol,

or acetone. It resembles alcohol more closely than pyroxylic spirit, having nearly the same density, and is miscible in all proportions with water without producing milkiness. This fluid is also sold under the name of *Naptha*. It is applicable to most purposes for which pyroxylic or wood spirit is used, and is often substituted for the latter. *This is the kind of Naptha which Dr. Hastings uses.*"

As it is probable that this substance will be sought after by physicians it has been thought proper to append the following notice of the mode of preparing it, taken from the excellent work of Graham, viz.: "Acetone may be conveniently prepared by distilling a mixture of two parts of acetate of lead and one of quick lime in a salt-glazed jar, the lower part of the jar being coated with fire-clay, and a bent glass tube half an inch in diameter, adapted to the mouth by a cork, so as to form a distillatory apparatus. The jar is supported in the mouth of a small furnace, by which the lower part of the jar only is heated to redness, and the vapors conducted into a Liebig's condenser. The residue is redistilled from quick lime repeatedly, till its boiling point is constant at 132°.

"Acetone is a limpid, colorless liquid, having a peculiar penetrating and slightly empyreumatic odor. Its density in the liquid state is almost the same as that of alcohol, 0.7921, and the density of its vapor being 2022, air being 1000; its taste is disagreeable, and analogous to that of peppermint. It is miscible in all proportions with water, alcohol, and ether. Many salts which are soluble in alcohol and water, are insoluble in acetone, particularly chloride of calcium and hydrate of potash; acetone is separated from water by dissolving such salts in the mixture of these liquids. Acetone is highly inflammable, and burns with a white flame."

The above notice is sufficiently explanatory, and gives a formula easily followed by those desirous of giving it a trial.

W. P.

ART. XLVII.—PHARMACEUTICAL AND TOXICOLOGICAL EXPERIMENTS ON DIGITALIS. By M. BONJEAN.

WHEN the powder of the leaves of *Digitalis* is treated by displacement with water, a very bitter solution is obtained, which contains nearly the whole of the active principles. On acidulating, sufficiently, the solution with sulphuric acid, a green resin is separated, in which appears to reside the diuretic virtues of this plant. This resin is insoluble in æther, soluble in dilute alcohol, and the alcoholic solution may be mixed in every proportion with water, without the resin being precipitated, although it is insoluble in water.

Powder of *Digitalis*, exhausted with water, abandons subsequently to alcohol the whole of the chlorophylle, mixed with a fresh proportion of resin, which appears to be of the same nature as that which sulphuric acid throws down from the aqueous infusion of the powder. After this two-fold treatment, the Digitalis is reduced to about half its weight. The powder, exhausted by water and alcohol, only contains a small quantity of a green coloring substance, or chlorophylle, which may be easily isolated by means of sulphuric æther.

One oz. of Digitalis powder furnishes about 18 to 20 grms. of a green resin, and 14 to 15 grms. of chlorophylle. It is to this latter substance that the tincture of Digitalis owes its beautiful green color. It is therefore obvious that this color has not the least influence on the properties of the remedy, and that the tincture will be the richer in green coloring substance the weaker the alcohol employed in its preparation.

To be efficacious as possible, the tincture of Digitalis should be prepared with alcohol of 0.975 to 0.972, and not with alcohol of 0.829 spec. grav., as recommended by all authors.

I consider the aqueous extract to be the most certain and most energetic of all the preparations of this plant.

When powder of Digitalis is acted on directly with æther, the whole of the chlorophylle is extracted, and nothing more. In this manner a tincture of a superb green color is obtained, but entirely deprived of medical properties, contrary to the opinion of MM. Leroyer, of Geneva, Planavia, and others, who regard æther as the best solvent for the active principle of the Digitalis. For my part, I have convinced myself that the æthereal tincture of Digitalis possesses no other properties than those which belong to æther itself.

The author then proceeds to describe several experiments made on some fowls with different preparations of this plant, from which he draws the following remarkable conclusions: "That the purple Digitalis has no injurious effect on fowls, to which very large doses of this plant were administered, either in powder, or in the form of aqueous or resinous extract. The flowers of the fox-glove have no more action, as a poison, on these animals, than the leaves. These results are very remarkable, if we consider that 6 grs. of the powder of Digitalis is sufficient to cause, in the space of from twelve to fifteen hours, the death of a strong dog, (see Orfilas' 'Traité des Poisons,' 3d edit., vol. ii., p. 285;) while 1½ to 2 oz., administered to fowls in the space of twenty-four hours, produce no morbid appearances. It is not possible to assign this inertness to the specimen of Digitalis employed in my experiments, when every day the physicians affirm the efficacy of the same plant, prepared in my laboratory, as a therapeutic agent.

"I had occasion to observe a fact of this kind in numerous experiments which I made on various animals with ergotized rye. Sometimes the oil extracted from this substance acted immediately in a dose of a scruple on fowls, which were narcotized within four to five minutes, and died in the space of a few hours. Sometimes the same oil, extracted from the

same powder, and obtained in the same experiments, had no appreciable effect on these animals, even in the dose of 2, 3, or 4 scruples. In this latter case, the poison produced merely a local irritation, and passed completely, without being absorbed into the evacuations, where the oil was found one or two hours after its injection. M. de Gasparin recently announced to the Academy of Sciences, that arsenious acid was not a poison for sheep affected with pleurisy.* I now announce a fact, which, if not so important in its consequences, is at least as curious; viz., that the purple Digitalis which is poison for man and dogs, has no injurious action o nfowls in a state of health."

Journ. de Pharm. for July, and *Chem. Gaz.*

* This assertion of M. Gasparin was, however, not confirmed by the commission appointed by the Academy of Sciences to inquire into the subject. See this Journal, p. 199. Ed.

ART. XLVIII.—ON THE PREPARATION OF QUINIA AND CINCHONIA. By M. F. C. Calvert, Preparateur du Cours de Chimie, Appliqué au Jardin des Plants a Paris.

M. Calvert remarks that similar amounts of the alkalies are not extracted with any regularity from equal weights of cinchona, although of the same quality of bark. This is due to the fact, that lime and the chloride of calcium are capable of dissolving quinia, and it is difficult to avoid using lime in excess.

The same objection may be urged against caustic ammonia and potassa, but not against caustic soda, as this, when added in excess, dissolves neither quinia or cinchonia. Of this insolubility he satisfied himself by repeatedly precipitating mixed solutions of the sulphates of quinia and cinchonia by caustic soda. The solutions, after filtration and saturation with hydrochloric acid, gave no indications of quinia with chlorine and ammonia. Similar solutions, treated in the same manner with soda and hydrochloric acid, gave no evidence of cinchonia with chloride of lime. He therefore concluded that the process of extracting these alkalies by lime was imperfect, and proposes that caustic soda be substituted for it, as all the vegetable bases will certainly be precipitated by it—an object of great importance to the manufacturer.

As the adulteration of sulphate of quinia by sulphate of cinchonia is frequently practised, and not easily detected, it appeared advantageous to be able to employ tests by which this fraud could be easily discovered, M. Calvert recommends the seven following reagents for this purpose:

1. The most approved is the chloride of lime. This precipitates both sulphate of cinchonia and sulphate of quinia; but, in excess, re-dissolves the quinia and not the cinchonia.

The delicacy of this test is such that it produces a precipitate with cinchonia where only one part is dissolved in 1500 parts of water. The sulphate of lime formed at the same time, having sufficient water for solution, does not precipitate.

2. Chloride of calcium does not precipitate sulphate of quinia, but produces a precipitate with sulphate of cinchonia.

3. Sulphate of quinia gives a precipitate with lime water, but is re-dissolved by an excess. The precipitate of cinchonia is not re-dissolved.

4, 5, 6. Ammonia, carbonate of ammonia, and potassa afford similar results.

7. Caustic soda produces a precipitate in both, which is not re-dissolved by an excess of the soda; but the quinia precipitate is pulverulent, and the cinchonia, curdy-white.

By these seven tests it will always be easy to distinguish between quinia and cinchonia, and to detect any admixture of these two bases, but the chloride of lime is that which should be employed when the proportion of cinchonia is very small.

L. Ed. D. Phil. Mag.

ART. XLIX.—AN EFFORT TO REFUTE THE ARGUMENTS ADVANCED IN FAVOR OF THE EXISTENCE, IN THE AMPHIDE SALTS, OF RADICALS, CONSISTING, LIKE CYANOGEN, OF MORE THAN ONE ELEMENT.

BY ROBERT HARE, M.D.

Professor of Chemistry in the University of Pennsylvania.

(*Concluded.*)

40. As respects the three phosphates of water, PO^5+HO, PO^5+2HO, PO^5+3HO, the argument used by Dr. Kane cuts both ways; although, by its employer, only that edge is noticed which suits his own purpose. It is alleged that the difference of properties, in these phosphates, is totally inexplicable upon the idea of three degrees of "hydration;" but that all difficulty vanishes, when they are considered as three different compound salt radicals, oxyphosphionides of hydrogen, PO^6+H, PO^7+2H, PO^8+3H.

41. To me the formation of three compound radicals, by the reiterated addition of an atom, of which five of the same kind were previously in the mass to which the addition is made, seems more anomalous, mysterious, and improbable, than the existence of three compounds of phosphoric acid with water, in which the presence of the different proportions of water is the consequence of some change in the constitution of the elements which is referred to isomerism.

42. No reason can be given why the addition of *one*, *two*, and *three atoms of oxygen*, to the "radical," should convey a power to hold a proportional number of atoms of hydrogen. Such an acquisition of power is an anomaly.

43. In the case of radicals formed with hydrogen in different proportions, as in acetyl and ethyl, formyl and me-

thyl, the number of atoms of oxygen in the peroxides, is the inverse of the hydrogen in the radical.

44. Ethyl, C^4, H^5, unites, at most, with one atom of oxygen, while acetyle, C^4, H^3, takes three atoms to form acetic acid, C^4, H^3, O^3. Methyl, C^2, H^3, forms, in like manner, only a protoxide, while formyl, C^2, H, takes three atoms of oxygen to constitute formic acid.

45. Besides the three oxyphosphions, of which the formulas are above stated, there would have to be another in the phosphites; so that instead of the hydrated acid, or phosphite of water, being PO^3+HO, it would have to be PO^4+H, a fourth oxyphosphionide of hydrogen.

46. Respecting the new principles which I have been contesting, Dr. Kane alleges, "that the elegance and simplicity with which the laws of saline combination may be traced from them is remarkable," because he conceives, that without an appeal to those principles, the fact that the number of equivalents of acid in a salt are proportionable to the number of equivalents of oxygen in the base, would be inexplicable.

47. Thus, when the base is a protoxide, we have one atom of the protoxide of hydrogen to take its place; when the base is a sesquioxide (two of radical and three of oxygen,) three atoms of the protoxide of hydrogen take its place: if the base be a bioxide, two atoms of the protoxide of hydrogen take its place.

48. I have already adverted to the existence of certain chemical laws, inexplicable in the present state of human knowledge. Among these is that of the necessity of oxidation to enable metallic radicals to combine with acids. But as a similar mystery exists as respects the adventitious property of combining with radicals, which results from the acquisition of an additional atom of oxygen by any of the compounds hitherto considered as anhydrous acids, the new doctrine has in that respect no pre-eminent claim to credence.

49. But if, without impairing the comparative pretensions of the prevailing doctrine, we may appeal to the fact that the acquisition of an atom of oxygen confers upon a radical the basic power to hold one atom of acid, is it not consistent that the acquisition of two atoms of oxygen should confer the power to hold two atoms of acid, and that with each further acquisition of oxygen a further power to hold acids should be conferred?

50. So far then there is in the old doctrine no more inscrutability than in that which has been proposed as its successor. Since if on the one hand it be requisite that for each atom of oxygen in the base, there shall be an atom of acid in any salt which it may form, on the other, in the case of the three oxyphosphions, for each additional atom of hydrogen extraneous to the salt radical, there must be an atom of oxygen superadded to this radical.

51. It being then admitted that, numerically, the atoms of acid in any oxysalt will be as the atoms of oxygen in the base, it must be evident that whenever an oxysalt of a protoxide is decomposed by a bioxide, there will have to be two atoms of the former for one of the latter. For the bioxide has two atoms of oxygen, and requires by the premises two atoms of acid, while the salt of the protoxide, having but one atom of oxygen, can hold, and yield, only one atom of acid. Two atoms of this salt, therefore, whether its base be water, or any other protoxide, will be decomposed by one atom of bioxide; provided the affinity of the acid for the bioxide predominate over that entertained for the protoxide, as when water is the base.

52. It follows, that the displacement of water from its sulphate, adduced by Kane, does not favor the idea that hydrous sulphuric acid is an oxysulphionide of hydrogen, more than the impression that it is a sulphate of water.

53. Of course, in the case of presenting either a sesquioxide, or a trioxide, to the last mentioned sulphate, in other

words, hydrous sulphuric acid, the same rationale will be applicable.

54. The next argument advanced by Dr. Kane is, that *some* of the acids of which the existence is assumed upon the old doctrine, are hypothetical, as they have never been isolated. This mode of reasoning may be made to react against the new doctrine with pre-eminent force, since *all* of the compound radicals imagined by it are *hypothetical*—*none* of them having been isolated.

55. The third argument of the respectable author above named is, that acids display their acid character in a high degree only when in the combination with water.

56. This argument should be considered in reference to two different cases, in one of which all the water held by the acid is in the state of a base, while in the other an additional quantity is present acting as a solvent. So far as water, *acting as a solvent*, facilitates the reaction between acids and bases, it performs a part in common with alcohol, ether, volatile oils, resins, vitrifiable fluxes, and caloric. Its efficacy must be referred to the general law, that fluidity is necessary to chemical reaction. "Corpora non agunt nisi soluta."

57. In a majority of cases, basic water, unaided by an additional portion acting as a solvent, is quite incompetent to produce reaction between acids and other bodies. Neither between sulphuric acid and zinc, between nitric acid and silver, nor between glacial or crystallized acids and metallic oxides, does any reaction take place without the aid of water acting as a solvent, and performing a part analogous to that which heat performs in promoting the union of those oxybases with boric, or silicic acid.

58. It is only with *soluble* acids that water has any efficacy. The difference between the energy of sulphuric and silicic acid, under the different circumstances in which they can reciprocally displace each other, is founded on the nature of the solvents which they require, the one being

only capable of liquifaction by water, the other by caloric.

59. In support of his opinions the author adverts to the fact, that with hydrated sulphuric acid, baryta will combine energetically *in the cold*, while a similar union between the anhydrous vapor and the same base cannot be accomplished *without heat*. But it ought to be recollected, that to make this argument good, it should be shown wherefore heat causes baryta, a perfectly fixed body to unite more readily with an aëriform substance in which increase of temperature must, by rarefaction, diminish the number of its particles in contact with the solid. If the only answer be, that heat effects some mysterious changes in affinity, (or as I would say in the electrical state of the particles,) it should be shown that the presence of water, or any other base, has not been productive of a similar change, before another explanation is held to be necessary. But I would also call to mind that the hydrated acid is presented in the liquid state; and if it be asked why water, having less affinity than baryta, can better cause the condensation of the acid, I reply, that it is brought into contact with the acid both as a liquid and a vapor, of neither of which forms is the earthy base susceptible. But if all that is necessary to convert anhydrous sulphuric acid into an oxysulphionide, be an atom of oxygen and an atom of metal, what is to prevent baryta and anhydrous sulphuric acid from forming an oxysulphionide of barium? All the elements are present which are necessary to form either a sulphate or oxysulphionide; and I am unable to conceive wherefore the inability to combine does not operate as much against the existence of radicals as of bases.

60. I would be glad to learn why, agreeably to the salt radical theory, anhydrous sulphuric acid unites with water more greedily than with baryta, and yet abandons the water promptly on being presented to this base. Why should it form an oxysulphionide with hydrogen more readily than

with barium, and yet display, subsequently, a vastly superior affinity for barium?

61. It seems to be overlooked, that anhydrous sulphuric acid, being the oxysulphion of the sulphites, ought to form *sulphites* on contact with metals.

62. But if the sulphate of water owe its energy to that portion of this liquid, which, by its decomposition gives rise to the compound radical oxysulphion, and not to the portion which operates as a solvent, wherefore in the concentrated state, will it not react with iron and zinc, without additional water, when, with dilution, it reacts most powerfully with those metals.

63. Some stress has been laid upon the fact, that sourness is not perceived, excepting with the aid of water, as if to derive force for the new doctrine from that old and popular, though now abandoned test of acidity; but it should be recollected that it is not the water which goes to form the compound element in the "*hydracids*," erroneously so called, which confers sourness. Will any one pretend that either sulphuric or nitric acid, when concentrated, is sour? Are they not caustic? Can any of the crystallized organic acids be said to have a sour taste, independently of the moisture of the tongue? The hydrated oily acids being incapable of uniting with water as a solvent, have none of these vulgar attributes of acidity. The absence of these attributes in prussic acid would alone be sufficient to render it inconsistent to consider them as having any connexion with the presence of hydrogen.

64. It has been remarked, that liquid carbonic acid does not combine with oxides on contact. To this I would add, that it does not combine with water under those circumstances, but, on the contrary, separates from it like oil, after mechanical mixture: nor does it, under any circumstances, unite with an equivalent proportion of water to form a hydrate. Of course, as it is not to basic water that it is indebted for its ability to become an ingredient in salts, it

cannot be held that this faculty is the result of its previous conversion into an *oxycarbionide of hydrogen*.

65. Chromic acid is admitted not to require water for isolation, and cannot, therefore, be considered as oxychromionide of hydrogen. Yet the oil of bitter almonds, which consists of a *compound radical*, benzule, and an atom of hydrogen, and which is therefore constituted precisely as the salt radical doctrine requires for endowment with the attributes of an "hydracid," is utterly destitute of that acid reaction which hydrogen is represented as peculiarly competent to impart. It follows that we have, on the one hand, in chromic acid, a compound endowed with the attributes of acidity, without being a hydruret of any compound radical; and, on the other, in oil of bitter almonds, a hydruret of a compound radical, without any of the attributes of acidity.

66. The last argument in favor of the existence of salt radicals, which I have to answer, is that founded on certain results of the electrolysis of saline solutions.*

67. On subjecting a solution of sulphate of soda to electrolysis, so as to be exposed to the current employed, simultaneously with some water in a voltameter, Daniell alleges that, for each equivalent of the gaseous elements of water evolved in the voltameter, there was evolved at the cathode

* It is well known that Faraday employed a very simple instrument to ascertain the quantity of the gaseous elements of water yielded in a given time, by a liquid subjected to the voltaic current. It consisted of a graduated tube, through the cavity of which the current was conveyed by wires, so terminating within it, as to have an interval between them through which the current, being conveyed by the electrolytic process, effected the decomposition of the intervening liquid, the resulting gas being caught and measured by the tube. This instrument has been called a volta electrometer, or voltameter.

Faraday found that when various substances were electrolysed, a voltameter being at the same time in the circuit, that for every equivalent of water decomposed within the tube, neither more nor less than an equivalent of the other body could be decomposed.

and anode, not only a like quantity of those elements, but likewise an equal number of equivalents of soda and sulphuric acid. This he considers as involving the necessity, agreeably to the old doctrine, of the simultaneous decomposition of two electrolytic atoms in the solution, for one in the voltameter; while, if the solution be considered as holding oxysulphionide of sodium, instead of sulphate of soda, the result may be explained consistently with the law ascertained by Faraday. In that case, oxysulphion would be carried to the anode, where, combining with hydrogen, it would cause oxygen to be extricated, while sodium, carried to the cathode, and deoxidizing water, would cause the extrication of hydrogen.

68. Dr. Kane, alluding to the experiments above mentioned, and some others which I shall mention, alleges that "*Professor Daniell considers the binary theory of salts to be fully established by them.*"

69. Notwithstanding the deference which I have for the distinguished inventor of the constant battery, and disinclination for the unpleasant task of striving to prove a friend to be in the wrong, being of opinion that these inferences are erroneous, I feel it to be my duty to show that they are founded upon a misinterpretation of the facts appealed to for their justification.

70. It appears to me, that the simultaneous appearance of the elements of water, and of acid and alkali, at the electrodes, as above stated, may be accounted for, simply by that electrolyzation of the soda, which must be the natural consequence of the exposure of the sulphate of that base in the circuit. I will, in support of the exposition which I am about to make, quote the language of Professor Daniell, in his late work, entitled, "Introduction to Chemical Philosophy," page 413:—

"Thus we may conceive that the force of affinity receives an impulse which enables the hydrogen of the first particle of water, which undergoes decomposition, to combine momentarily with the oxygen of

the next particle in succession; the hydrogen of this again, with the oxygen of the next; and so on till the last particle of hydrogen communicates its impulse to the platinum, and escapes in its own elastic form."

71. The process here represented as taking place in the instance of the oxide of hydrogen, takes place, of course, in that of any other electrolyte.

72. It is well known, that when a fixed alkaline solution is subjected to the voltaic current, that the alkali, whether soda or potassa, is decomposed; so that if mercury be used for the cathode, the nascent metal, being protected by uniting therewith, an amalgam is formed. If the cathode be of platinum, the metal, being unprotected, is, by decomposing water, reconverted into an oxide as soon as evolved. This shows, that when a salt of potassa or soda is subjected to the voltaic current, it is the alkali which is the primary object of attack, the decomposition of the water being a secondary result.

73. If in a row of the atoms of soda, extending from one electrode to the other, while forming the base of a sulphate, a series of electrolytic decompositions be induced from the cathode on the right, to the anode on the left, by which each atom of sodium in the row will be transferred from the atom of acid with which it was previously combined, to that next upon the right, causing an atom of the metal to be liberated at the cathode; this atom, deoxidizing water, will account for the soda and hydrogen at the cathode. Meanwhile the atom of sulphate on the left, which has been deprived of its sodium, must simultaneously have yielded to the anode the oxygen by which this metal was oxidized. Of course the acid is left in the hydrous state, usually called free, though more correctly esteemed to be that of a sulphate of water.

74. I cannot conceive how any other result could be expected from the electrolysis of the base of sulphate of soda, than that which is here described. Should any additional

illustration be requisite, it will be found in a note subjoined.*

* It is easy to understand how a simultaneous appearance of oxygen and acid at the anode, and soda and hydrogen at the cathode, may ensue, simply by the electrolyzation of the alkaline base from the following association of formulæ.

Anhydrous sulphuric acid is represented by the usual formula, SO^3; oxygen by the usual symbol, O; sodium by Na; water, acting as a solvent, by HO. Each atom of oxygen, sodium, or acid, is numbered from right to left, 1, 2, 3, 4, so that the change of position consequent to electrolysis may be seen.

	1	2	3	4	Water.	
Anode	O	O	O	O	HO	Cathode.
	$\overbrace{\text{Na}}^{1}$	$\overbrace{\text{Na}}^{2}$	$\overbrace{\text{Na}}^{3}$	$\overbrace{\text{Na}}^{4}$		
	$\overbrace{SO^3}^{1}$	$\overbrace{SO^3}^{2}$	$\overbrace{SO^3}^{3}$	$\overbrace{SO^3}^{4}$		
	HO	HO	HO	HO		

	1	2	3	4			
Anode.	O	O	O	O	O	H	*Cathode.*
		$\overbrace{\text{Na}}^{1}$	$\overbrace{\text{Na}}^{2}$	$\overbrace{\text{Na}}^{3}$	$\overbrace{\text{Na}}^{4}$		
	SO^3	$\overbrace{SO^3}^{2}$	$\overbrace{SO^3}^{3}$	$\overbrace{SO^3}^{4}$			
	HO	HO	HO	HO			

As the atoms are situated in the second arrangement, the atom of oxygen (1,) is at the anode, the atom of sodium, $\overbrace{\text{Na}}^{1}$, with which it had been united, having been transferred to the second atom of sulphuric acid, which had yielded its sodium to the third atom of acid, $\overbrace{SO^3}^{3}$, this having, in like manner, yielded its sodium to the fourth atom of acid, $\overbrace{SO^3}^{4}$, from which the fourth atom of sodium, $\overbrace{\text{Na}}^{4}$, had been abstracted by the electrolytic power. The atom of sodium thus removed from the fourth atom of acid, is represented in union with the oxygen of an atom of water, of which the hydrogen, H, is at the cathode.

75. I will, in the next place, consider the phenomena observed by Professor Daniell, when solutions of potassa and sulphate of copper, separated by a membrane, were made the medium of a voltaic current.

76. Of these I here quote his own account. Philosophical Magazine and Journal, Vol. 17, p. 172:—

"A small glass bell, with an aperture at top, had its mouth closed by tying a piece of thin membrane over it. It was half filled with a dilute solution of caustic potassa, and suspended in a glass vessel containing a strong neutral solution of sulphate of copper, below the surface of which it just dipped. A platinum electrode, connected with the last zinc rod of a large constant battery of twenty cells, was placed in the solution of potassa; and another, connected with the copper of the first cell, was placed in the sulphate of copper immediately under the diaphragm which separated the two solutions. The circuit conducted very readily, and the action was very energetic. Hydrogen was given off at the platinode in a solution of potassa, and oxygen at the zincode in the sulphate of copper. A small quantity of gas was also seen to rise from the surface of the diaphragm. In about ten minutes the lower surface of the membrane was found beautifully coated with metallic copper, interspersed with oxide of copper of a black color, and hydrated oxide of copper of a light blue.

"The explanation of these phænomena is obvious. In the experimental cell we have two electrolytes separated by a membrane, through both of which the current must pass to complete its circuit. The sulphate of copper is resolved into its compound anion, sulphuric acid + oxygen (oxysulphion,) and its simple cathion, copper: the oxygen of the former escapes at the zincode, but the copper on its passage to the platinode is stopped at the surface of the second electrolyte, which for the present we may regard as water improved in its conducting power by potassa. The metal here finds nothing by combining with which it can complete its course, but being forced to stop, yields up its charge to the hydrogen of the second electrolyte, which passes on to the platinode, and is evolved.

"The corresponding oxygen stops also at the diaphragm, giving up its charge to the anion of the sulphate of copper. The copper and oxygen thus meeting at the intermediate point, partly enter into combination, and form the black oxide; but from the rapidity of the action, there is not time for the whole to combine, and a portion of the copper remains in the metallic state, and a portion of the gaseous oxygen es-

capes. The precipitation of blue hydrated oxide doubtless arose from the mixing of a small portion of the two solutions."

77. It will be admitted, that agreeably to the admirable researches of Faraday, there are two modes in which a voltaic current may be transmitted, *conduction* and *electrolyzation.* In order that it may pass by the last mentioned process, there must be a row of anions and cathions forming a series of electrolytic atoms extending from the cathode to the anode. It is not necessary that these atoms should belong to the same fluid. A succession of atoms, whether homogeneous, or of two kinds, will answer, provided either be susceptible of electrolyzation. Both of the liquids resorted to by Daniell, contained atoms susceptible of being electrolyzed. If his idea of the composition of sulphate of copper, and the part performed by the potassa, were admitted for the purpose of illustration, we should, on one side of the membrane, have a row of atoms consisting of oxysulphion and copper; on the other, of oxygen and hydrogen.

78. Recurring to Daniell's own description of the electrolyzing process, above quoted, an atom of copper near the anode being liberated from its anion, oxysulphion, and charged with electricity, seizes the next atom of oxysulphion, displacing and charging an atom of copper therewith united. The cupreous atom thus charged and displaced, seizes a third atom of oxysulphion, subjecting the copper, united with it, to the same treatment as it had itself pre viously met with. This process being repeated by a succession of similar decompositions and recompositions, an electrified atom of copper is evolved at the membrane, where there is no atom of oxysulphion. Were there *no other anion* to receive the copper, evidently the electroly zation would not have taken place; but oxygen, on the one side of the membrane, must succeed to the office performed by oxysulphion on the other side; while hydrogen, in like manner, must succeed to the office of the copper.

79. Such being the inevitable conditions of the process, how can it be correctly alleged by Professor Daniell, the transfer of the copper being arrested at the membrane, that as this metal "*can find nothing to combine with*," it gives up its electrical charge to the hydrogen, which proceeds to the cathode? As hydrogen cannot be present, excepting as an ingredient in water, how can it be said that the copper can discharge itself upon the hydrogen, without combining with the oxygen necessarily liberated at the same time by the electrolytic process? How could the copper, in discharging itself to a cathion, escape a simultaneous seizure by an anion? Would not the oxidizement of this metal be a step indispensable to the propagation of that electrolytic process, by which alone the hydrogen could, as alleged, "*pass to the platinode*," i. e. cathode?

80. In these strictures I am fully justified by the following allegations of Faraday, which I quote from his Researches, 826, 828:—

"A single ion, i. e. one not in combination with another, will have no tendency to pass to either of the electrodes, and will be perfectly indifferent to the passing current, unless it be itself a compound of more elementary ions, and so subject to actual decomposition."

"If, therefore, an ion pass towards one of the electrodes, another ion must also be passing simultaneously to the other electrode, although, from secondary action, it may not make its appearance."

81. In explanation of the mixed precipitates produced upon the membrane, I suggest that the hydrated oxide resulted from chemical reaction between the alkali and acid, the oxide from the oxygen of the water or potassa acting as an anion in place of that of the oxide of copper; also that the metallic copper is to be attributed to the solutions acting both as conductors and as electrolytes; so that, at the membrane, two feeble electrodes were formed, which enabled a portion of the copper to be discharged without combining with an anion, and a portion of oxygen to be discharged

without uniting with a cathion. In this explanation I am supported by the author's account of a well known experiment by Faraday, in which a solution of magnesia and water was made to act as electrodes at their surfaces respectively.

82. There can, I think, be no better proof that no reliance should be placed on the experiments with membranes, in this and other cases where the existence of compound radicals in acids is to be tested, than the error into which an investigator, so sagacious as my friend Professor Daniell, has been led, in explaining the complicated results.

83. The association of two electrolytes, and the chemical reaction between the potassa and acid, which is admitted to have evolved the hydrated oxide, seem rather to have created difficulties than to have removed them.

84. In this view of the subject, I am supported by the opinion of Faraday, as expressed in the following language:—

"When other metallic solutions are used, containing, for instance, peroxides, as that of copper combined with this or any decomposable acid, still more complicated results will be obtained, which, viewed as the direct results of electro-chemical action, will, in their proportions, present nothing but confusion; but will appear perfectly harmonious and simple, if they be considered as secondary results, and will accord in their proportions with the oxygen and hydrogen evolved from water by the action of a definite quantity of electricity."

85. I cannot conceive, that in any point of view the complicated and "*confused*" results of the experiment of Daniell with electrolytes separated by membranes, are rendered more intelligible by supposing the existence of salt radicals. I cannot perceive that the idea that the anion in the sulphate is oxysulphion, makes the explanation more satisfactory than if we suppose it to be oxygen. Were a solution of copper subjected to electrolysis alone, if the oxide of copper were the primary object of the current, the result would be analogous to the case of sodium, excepting

that the metal evolved at the cathode, not decomposing water, would appear in the metallic form. If water be the primary object of attack, the evolution of copper would be a secondary effect.

86. It is remarkable, that after I had written the preceding interpretation of Daniell's experiments, I met with the following deductions stated by Matteuchi, as the result of an arduous series of experiments, without any reference to those of Daniell above mentioned. It will be perceived that these deductions coincide perfectly with mine.

87. I subjoin a literal translation of the language of Matteuchi from the Annales de Chimie et de Physique, tome 74, 1840, page 110:—

"When salt, dissolved in water, is decomposed by the voltaic current, if the action of the current be confined to the salt, for each equivalent of water decomposed in the voltameter, there will be an equivalent of metal at the negative pole, and an equivalent of acid, plus an equivalent of oxygen, at the positive pole. The metal separated at the negative pole will be in the metallic state, or oxidized according to its nature. If oxidized, an equivalent of hydrogen will be simultaneously disengaged by the chemical decomposition of water."

88. Thus it seems, that the appearance of acid and oxygen at the anode, and of alkali and hydrogen at the cathode, which has been considered as requiring the simultaneous decomposition of two electrolytes upon the heretofore received theory of salts, has, by Matteuchi, been found to be a result requiring the electrolysis of the metallic base only, and, consequently, to be perfectly reconcilable with that theory.

89. In fact I had, from the study of Faraday's Researches, taken up the impression, that the separate appearance of an acid and base, previously forming a salt, at the voltaic electrodes, was to be viewed as a secondary effect of the decomposition of the water or the base; so that acids and bases were never the direct objects of electrolytic transfer.

Of Liebig's "Principles," so called.

90. Under the head of the "theory of organic acids," in Liebig's Treatise on Organic Chemistry, we find the following allegations dignified by the name of principles. Manifestly they must tend to convey a false impression to the student, that hydrogen has a peculiar property of creating a capacity for saturation, instead of being only the measure of that capacity, as is actually true, and likewise that in this respect it has a peculiarity which does not exist.

91. The allegations to which I refer are as follows, being a literal translation from the French copy of the Traité of Liebig, page 7:—

"The hydrated acids are combinations of one or more elements with hydrogen, in which the latter may be replaced wholly or in part by equivalents of metals."

"The capacity of saturation depends consequently on the quantity of hydrogen which can be replaced.

"The compound formed by the other elements being considered as a radical, it is evident that the composition of this radical can exercise no influence on the capacity of saturation.

"The capacity of saturation of these acids augments or diminishes in the same ratio as the quantity of hydrogen, not entering into the salt radical, augments or diminishes.

"If into the composition of the salt radical there should be introduced an undetermined quantity of any elements, without changing the quantity of hydrogen extraneous to the radical, the atomic weight of the acid would be augmented, but the capacity of saturation would remain the same."

92. As by the advocates of the existence of "*salt radicals*," hydrogen is considered as playing the part of a metallic radical, and must, therefore, as respects any relation between it and the capacity of saturation, be in the same predicament as any other electro-positive radical, I cannot conceive wherefore laws, which affect every other body of this kind, should be stated as if particularly associated with hydrogen.*

* There is, in some respects, a coincidence so remarkable as to the part taken by Dr. Kane and myself, with respect to hydrogen, that I

93. Would not a more comprehensive and correct idea be presented by the following language?—

94. From any combination of an acid with a base, either the base or its radical may be replaced by any other radical or base, between which and the other elements present, there is a higher affinity. Of course from acids called hydrated, from their holding an atom of basic water, either this base, or its radical (hydrogen,) may be replaced by any other competent base or radical.

95. The premises being manifestly fallacious, still more so is the subsequent allegation, that in consequence of the hydrated acids being compounds formed with hydrogen,

quote here the language which has been held by us respectively on this subject.

Treating of hydrogen, Dr. Kane uses the following words:—"It was at one time supposed that it shared with oxygen the power of generating acids; and as sulphur, chlorine, iodine, cyanogen, &c., formed one class by combining with oxygen, so they formed a second class, called hydracids, by entering into union with hydrogen." * * * * * * In the year 1832 I proved this view to be incorrect, that all the properties of the compounds of hydrogen combined to show that it was an eminently electro-positive body, that it took place along with iron, manganese, and zinc. * * * * * * * "These views have been still farther corroborated by the researches of Graham." * * * * * * There rests now, no doubt, in the minds of philosophical chemists, that hydrogen is a metal enormously volatile.

This justifies the following language held in my letter on the Berzelian nomenclature.

"I am of opinion that the employment of the word hydracid, as coordinate with oxacid, must tend to convey the erroneous idea, with which, in opposition to his own definition, the author seems to have been imbued, that hydrogen in the one class, plays the same part as oxygen in the other. But in reality, the former is eminently a combustible, and of course the radical, by his own definition."

So entirely have I concurred in considering hydrogen as an aëriform metal, that, for more than twenty years, I have, in my lectures, accounted for the amalgamation of mercury when electrolysed in contact with sal ammoniac, by inferring ammonia to be a gaseous alloy of two metallic ingredients, hydrogen and nitrogen being both aëriform metals.

their capacity of saturation *depends* on the quantity of this element which can be replaced.

96. Is not this an inversion of the obvious truth, that the quantity of hydrogen present is as the capacity of saturation; and that, of course, the quantity of any element which can be substituted for it, must be in equivalent proportion? Would not a student, from this, take up two erroneous ideas—first, that the capacity of saturation is conferred by the radical, and in the next place, that of all radicals, hydrogen alone can give such a capacity? Is it not plain, that the assertion here made by the celebrated author, would be true of any radical?

97. Passing over a sentence which has no bearing on the topic under discussion, in the fourth allegation we have a reiteration and expansion of the error of those by which it is preceded. We are informed that the "*capacity of saturation augments and diminishes with the quantity of hydrogen which can be replaced,*" which is again an inversion of the truth, that the quantity of hydrogen varying with the capacity, the quantity of any other radical, competent to replace it, must be in equivalent proportion.

98. Is not the concluding allegation a mere truism, by which we are informed, "that if any undetermined quantity of any element should be introduced into the composition of the radical, without changing the capacity (as measured by hydrogen,) the capacity would be found the same when measured by any other radical?"

99. As all that is thus ascribed to hydrogen must be equally true of any other radical, there would have been less liability to misapprehension, had the generic term radical been employed wherever hydrogen is mentioned. But by employing the word radical to designate halogen elements, the advocates of the existence of compound radicals in amphide salts have deprived the word in question of much of its discriminating efficacy. In fact, their nomenclature would confound all ultimate elements under one ge-

neric appellation, and all their binary combinations under another, so that almost every chemical reagent, whether simple or compound, would be a salt or a radical.

100. Before concluding, I feel it to be due to the celebrated German chemist above mentioned, to add, that however I may differ from him as to the acids being hydrurets of compound radicals, I am fully disposed to make acknowledgments for the light thrown by his analytical researches on organic chemistry, and the successful effect of his ingenious theoretic speculations, in rendering that science more an object of study with physicians and agriculturists.

ART. L.—ON THE MODE OF PREPARATION AND THERAPEUTIC PROPERTIES OF ERGOTINE.

By M. Bonjean.

Powdered ergotized rye is treated with water in a displacement apparatus, and the aqueous solution heated over a water bath. By the action of the heat, this solution sometimes coagulates from the presence of a certain quantity of albumen; sometimes not. In the former case, the coagulum is separated by filtration; the liquid evaporated, over a water bath, to the consistence of a clear syrup, to which a large excess of alcohol is then added, which precipitates all the gummy substances; the liquid is then placed aside until all the gum has subsided, and the solution has reassumed its transparence and brightness, when it is decanted and reduced, over a water bath, to the consistence of a soft extract. In the second case, the aqueous solution is brought immediately to a semi-syrupy state, and then treated, as above, with alcohol, in order to obtain the extract

By this process, a very homogeneous, soft extract is obtained, of a reddish-brown color, and of an agreeable odor of roast meat, owing to the presence of ozmazome, and of a slightly piquant and bitter taste, resembling more or less that of spoiled wheat. It forms, with water, a beautiful red solution, perfectly transparent. 500 grammes of ergot afford from 70 to 80 grms. of extract.

Ergotine is a true specific against hæmorrhage in general. It is well known to what inconveniences the use of ergotized rye in medicine was subject; such, indeed, that it was talked of banishing for ever, from therapeutics, this valuable agent, because its good virtues were accompanied with an energetic poison, which it was necessary to guard against. At present, four years of research have enabled me to explain the whole matter; and nothing is now more easy than to separate from ergot the two principles which it contains, which differ entirely in their mode of action, since the one, the ergotine, acts principally on the arterial membranes, while the other, the oil, exerts its action on the nervous centres.

The immediate effects which it produces in the most violent metrorrhagia, will strike every one who shall have tried my ergotine; the most violent vomitings of blood give way in a very little time to its employment, and relapses are generally rare, especially when the precaution has been taken to continue its employment a certain time after cessation of the symptoms. To be convinced, moreover, that the ergotine is the *obstetrical* principle, it suffices to treat the powder of ergot by ether in a displacement apparatus, as long as any soluble matter is taken up by this liquid. In this manner, the whole of the poison, that is, the whole of the oil of ergot and the resin, are removed, and there remains a powder no longer greasy, but gritty like sand; without bad taste; without any poisonous action, and which excites powerfully the uterine contractions, in doses of from 0.4 grms. to 0.5 grms., in all cases of inertia of the matrice,

where the employment of ergotized rye is considered advantageous.

Comptes Rendus, July 17th, 1843, and *Chem. Gaz.*

ART. LI.—EXTRACTA NARCOTICA CUM SACCHARO, AND MOSCHUS CUM SACCHARO, *according* to M. GAUGER.

NARCOTIC extracts are frequently ordered in a pulverulent form, mixed with sugar. As the mixing of them with sugar is accompanied with considerable difficulty, from the alcoholic extract being generally very adhesive, and it is impossible, even with the greatest pains, to scrape the whole from the sides of the mortar and pestle employed—a difficulty which becomes greater when adhesive or resinous substances are added to them, such as *Sulph. Aurat. Antim.*, *Calomel*, *Guaiacum*, and other powders; furthermore, as these extracts are usually administered in very small doses, and it must be of importance to the physician that the patient should receive accurately the quantity ordered,—M. Gauger advises preparing mixtures of such extracts and sugar in the following manner, and keeping them on hand.

Six oz. of alcoholic extract, freshly prepared in summer, are dissolved in a sufficiently large mortar of porcelain and glass pestle, the weight of which has been previously taken, in from ʒxiv. to ℥ij. of alcohol of 0.815 to 0.793 spec. grav., and then two and a half pounds of pulverized white sugar gradually added under constant stirring. When the whole has been properly mixed, a leaf of blotting paper is tied round the mortar, which is then placed in a moderately

warm situation to dry; the whole is then weighed, and so much powdered sugar added to it as is found requisite to bring the weight of the dried mixture to 3 pounds (troy.) In drying the mixture of the extract and sugar, the alcohol evaporates, and carries with it the water which had remained in the extract, which renders the mixture so much the lighter. The preparation is now pulverized, and passed through a fine hair sieve. Six grains of the powder contain exactly one grain of extract. It keeps exceedingly well in a dry situation, even when the air has access.

Extract, mixed with sugar in this manner, may be dispensed very easily and quickly, and it may be readily mixed with other substances; it may, moreover, be kept for years, and in a cool place, without spoiling.

M. Gauger recommends the preparation of Musk in the same manner, by rubbing one ounce of musk with an ounce and a half of alcohol, as before, and then triturating with 3 ounces of sugar, drying, and again pulverizing. Six grains of this powder represent one of musk, and in such a form as to be instantly available for administration.

Gauger's *Repertorium*, 1842, p. 453, and *Chem. Gaz.*

ART. LII.—DESCRIPTION OF A VERY SIMPLE PROCESS FOR PREPARING HYPO-SULPHITE OF SODA.

By M. Walchner.

Having received an order for several pounds of this salt, which has of late come into very extensive use, both for preparing, as well as for gilding, Dauguerreotype portraits, I was induced to search for a more simple method of preparing it than that generally followed. I found that this salt may be obtained in a very short time, and in great quantity, by the following simple process:—Pure crystallized carbonate of soda is dried as much as possible, and reduced to a fine powder; one pound of it is then mixed with ten oz. of flowers of sulphur, and the mixture heated in a glass or porcelain dish, gradually, until the sulphur melts. The mass, which cakes together, is kept at this temperature, and is divided, stirred, and mixed, in order that each part may be brought into contact with the atmosphere. The sulphuret of sodium formed, passes, under these circumstances, by the absorption of oxygen from the atmosphere, with a slight incandescence, gradually into sulphite of soda. It is dissolved in water; filtered; the liquid immediately boiled with flowers of sulphur; the filtered, nearly colorless, strongly concentrated liquid affords hypo-sulphite of soda, in very pure and beautiful crystals, and in large quantity.

When the mixture is heated too quickly, some sulphur is easily burnt; there then remains a portion of undecomposed carbonate of soda, which contaminates the hypo-sulphite in the first crystallization, but which may very readily be separated from it.

Ann. der Chem. und Pharm., for May, and *Chem. Gaz.*

ART. LIII.—POTATO STARCH.

Dr. PEREIRA has published in the *Pharmaceutical Journal* some interesting observations on this fecula, which it appears is extensively used in England for adulterating dietetical and pharmaceutical substances, and is sold in the shops under various names.

"At some of the Italian warehouses in London, it is sold under the name of potato-flour; being used by cooks in the preparation of souffles, and sometimes for thickening gravies, sauces, &c., on account of its being cheap, tasteless, and soluble.

"At Mr. Butler's, in Covent Garden market, it is sold in tin canisters, under the name of English arrow-root, and is used as a farinaceous food for infants and invalids, as well as for the preparation of puddings.

"Bright's nutritious farina is a carefully prepared potato-starch, very slightly colored and aromatized. It is used for the same purposes as the preparation last referred to; it makes very agreeable puddings.

"The powder sold as the Prince of Wales' food, prepared by the Patent Farina Company, is potato-starch.

In High Holborn, there is an establishment professing to sell Indian-corn-starch. On examination, Mr. P. found that the substance sold under this name is potato-starch, to which a blue tinge has been communicated, probably by indigo. The naked eye is sufficient to recognize it. By the microscope, the shape and size of the grains, which are very different to those of the real fecula of maize, or Indian corn, readily distinguish it as potato-starch.

"The powder sold as Anderson's soluble starch, is identical with the so-called Indian corn-starch; in other words, it is colored potato-starch.

"Bright's universal sanative breakfast beverage is a mixture of potato-starch and chocolate. To the latter substance it owes its color, odor, and flavor. When prepared for use, with either water or milk, it forms a thickish liquid."

Potato-starch is sometimes used to adulterate West Indian arrow-root; and an imitation sago is sometimes prepared with it. It is also extensively used in England in the manufacture of potato-sugar, which is employed by fraudulent grocers for mixing with the common brown cane sugar.

"In reference to the detection of potato-starch," Dr. P. remarks, "it may be readily distinguished by the naked eye of an experienced person from all other commercial feculas, *tous les mois* alone excepted. It presents a remarkable glistening, satiny, pearly, or sparkling appearance, somewhat like that of a number of minutely divided globules of mercury. Though it is difficult to convey an accurate and precise idea of this property by words, yet it is one which is instantly recognized when a sample of this starch is attentively examined. It arises from the large size of the amylaceous grains. Moreover, potato-starch wants that dull or dead white appearance presented by West Indian arrow-root. It gives the idea of the particles being slightly translucent.

"In the large size and slight translucency of its grains, *tous les mois* agrees with potato-starch; indeed, they are somewhat larger than those of the latter starch. Hence, therefore, the naked eye may confound these two feculas.

"The microscope is the most important agent in distinguishing the different starches from each other; and by it we can readily detect potato-starch. We recognize it by the size, shape, and structure of its grains. Though the size varies somewhat, yet on the average it exceeds that of other commercial starches, always excepting *tous les mois*, whose grains, as I have already stated, are rather larger. I have, however, occasionally met with samples of potato-starch, whose grains nearly equalled in size those of *tous les*

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mois. The actual size of the grains varies from 1-600th to 1-30th of a line in diameter. The shape of small (or youngest?) grains of potato-starch is circular, or globular; but that of the larger ones is elliptical, oblong, ovate, or obtusely triangular. Perhaps we may assume that the normal form of the fully developed particles is ovate. The structure of the grains is the next point deserving of our attention. When examined by a polarizing microscope, we observe, by the black cross which they present, that they possess a depolarizing, or doubly refracting, structure, which is to be regarded as an indication of their consisting of a structure unequally dense. By the common microscope, we discover, on some part of the surface of the grain, one hilum, or, in some cases, two hila—one at either end, or two at the same end. The hilum is a circular hole, which was formerly thought to be a kind of umbilicus, by which, according to some writers, the starch-grain was originally attached to the parent vesicle in which it was developed. It is now regarded as the circular section of the tube, or passage, by which the amylaceous substance is introduced into the interior of the starch-grain. On large and old grains of starch we observe a number of cracks which commence at the hilum.

"On the surface of the grains is a series of curved lines, forming a system of either concentric or eccentric rings, or zones, which surround the hilum. They are similar to the curved lines observed on bivalved shells, as the mussel, and which indicate the terminations of the successive layers of which these shells are composed. The grains of every kind of starch, which I have hitherto examined, present a hilum and some traces of rings; but in the smaller grained starches, as rice-starch and the Portland arrow-root (starch of *Arum maculatum,*) they are very imperfectly perceived. *Tous les mois* and potato-starch, probably on account of the size of their grains, show these rings in the most distinct manner.

"The starch grains are composed of a series of juxta-posed concentric layers, which may be compared to the laminæ of an onion. Of these layers, the innermost are the most recently formed. The composition of all of them is the same, but their cohesion is different; the inner or younger ones being less cohesive, and, therefore, more readily soluble than the outer or older ones. The rings, or rugæ, so distinctly perceived on grains of potato-starch, depend on the concentric layers."

ART. LIV.—OBSERVATIONS AND RESEARCHES UPON A NEW SOLVENT FOR STONE IN THE BLADDER. By ALEXANDER URE, A. M., Surgeon to the Western Ophthalmic Institution, Honorary Member of the Pharmaceutical Society.

In pursuing some inquiries relative to the treatment of certain forms of urinary disease, my attention was directed to the properties of carbonate of lithia, a substance of which no therapeutic application has been heretofore made. It nevertheless occurs as a constituent of various mineral waters; namely, in those of the Kreuzbrunnen of Marienbad, of Klausen, of the Josephsquelle at Bilin, of the Obersalzbrunnen in Silesia, of Lubien in Galicia, of the Kränchen at Ems, and of the Franzensbrunnen at Eger. The four first named waters have, according to Osann, one of the latest and most complete writers on the subject, been found of service in some unhealthy conditions of the urinary organs.*

* *Physiklaisch-medicinische Darstellung der bekannten Heilquellen.* Berlin, 1839, page 94.

Carbonate of lithia dissolves in water at the ordinary temperature of 60° Fahr., to the amount of one per cent. From its sparing solubility it may be said to form the connecting link between the earths and alkalis. It possesses a faintly alkaline by no means unpleasant taste. No opportunity has yet been afforded me of ascertaining whether it passes through the circulation unchanged, although analogy would lead to the supposition that such was the case. It has a remarkable affinity for uric acid; so much so, that if finely pulverized *lepidolite* (a hard siliceous mineral containing three or four per cent. of lithia) be boiled along with uric acid in water, urate of lithia is formed. A fact pointed out by M. Lipowitz, and which has been lately verified by myself.

According to the chemist above mentioned, one part of carbonate of lithia, dissolved in water, and boiled along with an excess of uric acid, dissolves four parts of the latter, which are held in solution after cooling. Urate of lithia is indeed the most soluble salt which that acid forms. It crystallizes by evaporation in the shape of small grains, which require sixty parts of water, at the temperature of 60° Fahr., to dissolve them. It contains 14.4 per cent. of lithia.*

In order to determine the solvent powers of carbonate of lithia, with reference to uric acid and its compounds, at the common temperature of the human body, I instituted the following experiments:

A solution of one grain of carbonate of lithia in an ounce of distilled water was brought to a temperature of 98°, and pure uric acid gradually added in minute portions until it ceased to dissolve. The quantity thus taken up was 2.3 grains. The resulting solution, which remained unchanged the following morning, being saturated with hydrochloric acid, threw down a precipitate of uric acid, amounting to two grains. Now it will be seen, by referring to my paper on the "solvents for calculous concretions," published in the

* Berzelius, *Rapport Annuel.* 1843, page 325.

fifth number of the Pharmaceutical Journal, vol. i., that one grain of crystals of soda, dissolved in an ounce of water, took up only one grain of uric acid—that one grain of carbonate of potash took up 1.4 grains—one grain of borax, 1.2 grains—and four grains of bicarbonate of soda, 1.1 grains. Hence it follows that the solvent power of carbonate of lithia is more than double that of carbonate of soda; nearly double that of carbonate of potash or borax; and about eight times that of bicarbonate of soda, which is the active ingredient of the Vichy water.

A human urinary calculus, now on the table of the Society, composed of uric acid, with alternate layers of oxalate of lime, having been most accurately poised, after being previously brought to hygrometric repose, by digesting in fresh urine, and then carefully dried, was placed in a solution of four grains of carbonate of lithia, in an ounce of distilled water, and steadily maintained at a blood-heat by means of a water bath, during five consecutive hours. On being withdrawn, nicely washed, and again dried as before, it was found to have lost five grains in weight, which is at the rate of one grain an hour. The calculus is deeply eroded in different parts, but the delicate laminæ of oxalate of lime remain intact, imparting to the surface the appearance of deep etching. The menstruum acquired a pale yellow tinge, and there fell down from it, on cooling, a light flocculent deposit of urate of lithia, in which silky crystalline tufts could be discerned by help of the microscope. It was still alkaline to litmus. Decomposed by means of hydrochloric acid, it yielded nearly three grains of pure uric acid.

In another experiment, the remaining half of the same calculus being allowed to stand during four hours in two ounces of the natural Vichy water, from the spring called *Hôpital*, (containing three grains and a half of carbonate of soda,) was found to have parted with two-tenths of a grain of uric acid; while the former portion of the calculus, placed under precisely similar circumstances, at the same time, in

a solution of 1.6 grains of carbonate of lithia to two ounces of distilled water, afforded nine-tenths of a grain of uric acid. Thus is demonstrated the very superior solvent agency of the above feeble lithia solution over the Vichy water.

Half a grain of urate of soda (the ordinary basis of gouty concretions or chalk stones) diffused in an ounce of distilled water at the blood heat, completely dissolved with the addition of one grain of carbonate of lithia, the solution continuing limpid and unaltered; whereas, half a grain of the same urate, in a similar quantity of water at a corresponding temperature, rests apparently unchanged, as may be seen in the two phials before you. Urate of soda, as pointed out in my paper on Gouty Concretions, published in vol. xxiv. of the Medico-Chirurgical Transactions, is about as insoluble as uric acid.

It deserves notice, that when fresh healthy urine is rendered alkaline by carbonate of lithia, no deposition ensues.

A very large proportion of the stones which occur in the urinary bladder of man, are composed in whole or in part of uric acid. Of all the various menstrua hitherto recommended, none appears to promise more favorably than the carbonate of lithia, from the promptitude and energy with which in dilute solution it attacks calculi of this description. If, by means of injection,-we can reduce a stone at the rate of a grain or more an hour, as the above experiment would lead us to anticipate, we shall not merely diminish the positive bulk of the calculus, but farther loosen its cohesion, disintegrate it, so to speak, causing it to crumble down and be washed away in the stream of the urine. Cases may present themselves in which it may be expedient to conjoin the use of the lithontriptor; but only occasionally, and at long intervals. It is the frequency of repetition which renders that instrument so hazardous.

It may be presumed, moreover, that the plan of throwing in a weak solution of this kind, would generally exercise a beneficial influence in obviating irritation, by removing the

sharp angular points and asperities of the broken fragments, where the practice of crushing is adopted.

No apprehension need be entertained from the administration of injections if judiciously directed. Sir Benjamin Brodie found that the bladder bore without inconvenience a stream of fluid composed of two minims and a half of nitric acid for each ounce of distilled water. An Austrian surgeon has recently introduced vinegar into the bladder, with excellent success, in an instance of phosphatic calculus. Mons. Lisfranc, the eminent French surgeon, has used in like manner tincture of cantharides for the cure of enuresis; and I myself have thrown a dilute solution of nitrate of silver into the bladder, with the best effect, in cases of chronic catarrh of that viscus.

Nothing has hindered me from trying the carbonate of lithia but its extreme scarcity. I would, therefore, suggest the importance of its preparation to the pharmaceutical chemist. The mineral called *spodumene,* which is found at Killiney, near Dublin, contains, according to Stromeyer's analysis, 5.6 per cent. of lithia.

Lond. Pharm. Journ. and Trans.

ART. LV. COMPARATIVE EXAMINATION OF SEVERAL KINDS OF SARSAPARILLA. By M. Marquart.

The following experiments were made with 250 grs. of each kind:

	Vera Cruz.	*Lisbon.*	*Honduras.*	*Lima.*	*Caraccas.*	*Jamaica.*	*Honduras?*
Amount of extract by infusion.............	Grains 25	Grains 14	Grains 12	Grains 36	Grains 16	Grains 28	Grains 26
Colour of the infusion.........	Light brown	Reddish brown	Slightly light brown	Very red	Light brown.	Reddish brown	Reddish brown
Amount of extract which dissolves in rectified spirits of wine...............	23	10	10	26	12	14	18
The residue contains........................	Sulphates	Sulphates and albumen	....	sulphuric, phosphoric acid, and potash	Gum	Potash and sulphuric acid	Potash
Amount of extract obtained by decoction.	32	26	24	42	22	40	
Colour of the decoction......................	Dark brown	Reddish brown	Light brown	Dark red	Brown	Reddish brown	
Amount of extract which dissolves in alcohol..	25	16	12	28	12	28	
The residue contains........................	Starch	Starch	Starch	No starch	Starch	No starch	

The alcoholic solutions of all the above-mentioned sarsaparillas had, without exception, an acid reaction. Lime-water produced in none an immediate turbidness, even on standing no precipitate, but on boiling a somewhat voluminous sediment, with the exception of the last and that from Lima, which even on boiling afforded but a very slight precipitate. *Oxalate of ammonia* produced in all no opacity, or but a very slight one, and after 24 hours a small white sediment. *Acetate of lead* produced in all the solutions considerable precipitates (with the exception of the first, which was only rendered very turbid, and after 24 hours presented a considerable sediment.) The precipitate was fawn-colored, in the two last of a chocolate color. The following tests gave various results:

	Perchloride of Iron.	*Perchloride of Mercury.*	*Sulphuric Acid.*	*Nitrate of Silver.*	*Caustic Ammonia.*	*Gelatine.*
Vera Cruz.	Dark colouring. After 24 hours, dark colouring.	Very slight turbidness. After 24 hours, opacity and sediment of light brown colour, which subsides very slowly.	No change. After 24 hours, no change.	A slight turbidness. After 24 hours, gray colour, becoming grayish-brown by boiling; on the addition of nitric acid, a yell. wh. precip. sol. in amm.	No change. After 24 hours, no change.	No change. After 24 hours, no change.
Lisbon.	Dark colouring and considerable precip. After 24 hours, a considerable gray sediment.	No turbidness. After 24 hours, opakeness and slight precipitate.	Very faint turbidness. After 24 hours, small precipitate.	Brighter col. and strong precip. After 24 h., consid. yell. wh. precip. soluble in caustic ammonia, not in nitric acid.	No change. After 24 hours, slight sediment.	As above.
Honduras	A blackish-brown coloring. After 24 hours, a blackish-brown color and precipitate.	A slight turbidness. After 24 hours, a heavy sediment attached to the sides of the vessel.	No change. After 24 hours, no change.	Considerable precipitate. After 24 hours, a large whitish-gray sediment, soluble in caustic ammonia.	No change. After 24 hours, a very voluminous precipitate.	As above.
Lima.	Dark brown, nearly black colouring. After 24 hours, blackish-brown colouring and large precipitate.	No turbidness. After 24 hours, a heavy white precipitate.	No change. After 24 hours, considerable voluminous precipitate.	Considerable precipitate. After 24 hours, large white sediment, soluble in ammonia.	No change. After 24 hours, small crystals attached to the sides and bottom of vessel.	A *considerable* precip. After 24 hours the precip. had become attached to the sides of vessel.
Caraccas.	Blackish-brown coloring and precipitate. After 24 hours, dark solution and considerable grayish-brown precipitate.	No change. After 24 hours, a white sediment attached to the vessel.	No change. After 24 hours, a slight precipitate.	Considerable precipitate and brownish-yellow colouring. After 24 hours, large dirty-white precipitate, soluble in ammonia.	No change. After 24 hours, no change.	No change.
Jamaica	Blackish-brown coloring and large precip. After 24 hours, consid. gray sediment and blackish-brown coloring.	No change. After 24 hours, a heavy white sediment.	Slight opacity. After 24 hours, considerable reddish-brown precipitate.	Considerable precipitate. After 24 hours, considerable flesh-colored sediment, soluble in ammonia.	Darker coloring. After 24 hours, dark brown coloring and slight white sediment.	A precipitate. After 24 hours, had become attached to sides of vessel.
Honduras?	Blackish-brown coloring and large precip. After 24 hours, considerable blackish-brown precipitate.	Slight turbidness. After 24 hours, considerable light sediment.	No change. After 24 hours, considerable chestnut-brown precipitate.	Considerable precipitate. After 24 hours, large sediment, soluble in ammonia.	Darker colouring and precipitate. After 24 hours, slight flesh-coloured precipitate.	A precipitate.

Jahrb. fr Prakt. Chem., vi. p. 40,

MINUTES OF THE PHARMACEUTICAL MEETINGS.

May 1st, 1843.

Dr. Carson in the Chair.

The minutes of the last meeting were read and adopted.

The Journal de Chimie Medicale, for March, the Journal de Pharmacie et de Chimie, for February, and the American Journal of Pharmacy, for April, were laid on the table.

A communication from Augustine Duhamel, on "Camphorated Tincture of Soap," as prepared by the formula of the U. S. Pharmacopœia, was read and referred for consideration to W. Procter, Jr., and H. W. Worthington. The paper was accompanied by two specimens; one made by the formula of the Pharmacopœia, and the other by directions given in the essay.

A specimen of Citrate of Iron was presented by William Procter, Jr., who stated that it was composed of two parts of peroxide of iron, and three parts of citric acid; and that it was a point of great importance in its preparation to avoid a boiling temperature, because the texture, or consistence, of the oxide is thereby changed, and combines less readily with the acid.

A quantity of the fecula of the *Arum triphyllum* was presented by Daniel S. Jones, by whom it was prepared. It had all the good qualities of the Bermuda arrow-root, though less brilliant in its appearance, owing to the granules being more minute.

Several recent tubers of the *Maranta arundinacea* were exhibited to the meeting by William Procter, Jr., who had received them from Bermuda.

Dr. Carson called the attention of the meeting to the subject of the adulteration of olive oil with lard oil. He

had been informed that the latter substance was exported from here to France, and then used as a means of adulterating olive oil, which its character renders it very capable of. The object of the statement was to ascertain if any chemical means were known by which its presence could readily be detected. The subject not having engaged the attention of any members present, was deferred.

Charles Ellis stated that lard oil could be used with olive oil in making lead plaster, but that the product, after some time, acquired a disagreeable odor.

On motion, adjourned.

September 4th, 1843.

Dr. Carson in the Chair.

The minutes of the preceding meeting were read and adopted.

Dr. Bridges, the American Editor of Graham's Chemistry, presented to the College a copy of that work.

William Procter, Jr., on behalf of the commission charged with the remarks of Augustine Duhamel on "Camphorated Tincture of Soap," reported in favor of its publication.

Dr. Carson called the attention of the meeting to a specimen of the fruit of the *Adansonia digitata*, or monkey-bread-tree. It consists of an outer rind, covered with short yellowish hairs, which inclosed a quantity of seeds, embedded in a yellowish pulpy matter.

Also, to a production from the West Indies, called there "Antidote Cocoon;" which is a large flat seed, consisting of a hard shell, inclosing an oily, extremely bitter kernel. This seed is obtained from a large gourd-like fruit, and, when steeped in brandy, the tincture thus formed is used in the West Indies in cases of cholic, cholera, etc. It is the product of the *Feuillia cordifolia*.

William Procter, Jr., presented, for the examination of the members, the fruit of the *Bombyx heptaphylla*, the

down of which is used in the West Indies for stuffing cushions, etc.

The fruits of several other West Indian plants were also exhibited, and, among them, that of the *Cameraria latifolia.* The juice of this tree, when evaporated, is used as a cement. It is also poisonous, like the *Rhus radicans* of this country.

MISCELLANY.

On the kind of death determined by Hydrocyanic Acid, and the Substances which contain it. By Dr. Hayn.—In the observation of cases of poisoning by hydrocyanic acid, which have hitherto been published, the rapidity of death, almost instantaneously supervening, prevented the verification of the reality of certain peculiarities observed by Orfila, Viborg, Krimmer, &c., in their experiments on animals, viz.: that the primary action of hydrocyanic acid especially consisted in a decomposition of the constituent principles of the blood; that the spinal marrow and the vague nerve, were only secondarily affected in their motive functions; and, finally, that the paralysis of the respiratory apparatus was only the result of this pathological modification of the spinal marrow and vague nerve. It is, therefore, not uninteresting to make known a case of poisoning of this kind, in which the slow poisonous effect admitted of the *modus operandi* being ascertained in a very positive manner.

An hypochondriac, of very advanced age, drank one morning about 45 grammes of hydrolate of cherry-laurel. He had had an opportunity of procuring this liquid beforehand, and when symptoms of poisoning manifested themselves, he did not endeavor in any way to deny the cause to which they were due. These symptoms, which did not show themselves until three hours after the poison had been swallowed, were as following:—Paralysis of the hands and feet; head strongly iuclined forwards, without it being possible for the patient to hold it erect; involuntary excretion of urine and stools; the extremities, although immovable and cold, had not, however, lost their sensibility; the pulse was small; the voice hoarse, but distinct; the intellectual faculties were perfectly intact.

The patient observed with satisfaction the incessant progress of the weakness which he experienced; notwithstanding all the care lavished on him, he died towards evening, without pain or convulsions, of paralysis of the lungs.

On *post mortem* examination, the blood was found gluey, and of a very peculiar, dark color; but it was impossible to detect the odor proper to

bitter almonds, which, moreover, as is known, is not a constant characteristic. *Hufeland's Journal, from The Chemist.*

Capsules of Copaiba and Rhatany. By Mr. A. J. Cooley.—Ricord has recommended capsules of copaiba, coated with extract of rhatany, as much superior to the common ones of copaiba alone, in the treatment of blennorrhœa. They may be easily prepared by either of the two following methods :—

1. By immersing, for an instant, the common capsules in the following composition ; or,
2. By forming the bodies of the capsules with the *composition*, instead of with *gelatine*, and following the same manipulations as for the manufacture of the common gelatine capsules :—

THE RHATANY COMPOSITION.

℞ Ext. rhatan., newly prepared from the root,	3 parts.
Syrup of moist sugar, - - - - -	1 "
Mucilage of gum Arabic, - - - -	1 "

Melt the extract and reduce it in a water bath until sufficiently stiff, when cold ; do the same with the syrup and gum ; then mix them together while hot, but only in such quantity as may be used at one time.

These capsules are said to sit well upon the stomach, the tone of which they contribute to improve. *Ibid.*

Adulteration of Opium.—An Armenian, who had been for many years engaged in the extraction of opium, informed M. Landerer, of Athens, that one of the adulterations of opium consisted in mixing it, in the soft and fresh state, with grapes well crushed and freed from their stones. He assured him that not a single cake of opium comes from the East without having undergone this adulteration.

Another adulteration consists in pounding, in a stone mortar, the epidermis of the capsules and stalks of poppies with white of egg, and in incorporating this mixture, in certain proportions, with opium.

Ibid.

Therapeutical Employment of Vanilla. By Dr. Herschmann.—Dr. Herschmann extols this substance as a medicament, and, according to him, the practitioners of the present age have done wrong in allowing it

to sink into oblivion. He affirms that he is fully convinced of the remarkable effects which may be obtained from its employment in the treatment of adynamic fevers, and especially in cases of hysterics. He prescribes vanilla under the form of infusion, prepared in close vessels, with from 1 to 4 parts of substance to 100 or 150 parts of boiling water. This quantity, properly edulcorated, is administered by spoonfuls in the course of the twenty-four hours.

Sachs's Allgem. Medicin, Central-Zeitung, from Ibid.

Electuary of Turpentine By M. Bouchardat.

℞ Gum Arabic, - - - - - -	10
Mix with water, - - - - - - -	10
Add white honey, - - - - -	50
Then, essence of turpentine, - - -	50
Carbonate of magnesia, - - - -	Q.S.

F. S. A. an electuary of a soft consistence.

To be administered, in the dose of from 2 to 10 grammes per diem, in unleavened bread.

From the example of M. Royer, it is sometimes useful to associate with this formula a small proportion of opium, or Rousseau's laudanum, 10 or 12 drops, which is added to the mucilage, for all the foregoing doses. *L'Expérienca, from Ibid.*

Preparation of Hydrochlorate of Morphia.—M. Michiels, of Antwerp, advises the following process for preparing the hydrochlorate of morphia. He obtained, by ten ounces, more of the salt from 50 kilogrammes of opium than he would have procured by Gregory's process. Ten kilogrammes of opium are treated with a sufficient quantity of cold water by the displacement method. The opium having been exhausted, and the solution filtered clear, it is concentrated at a moderate heat, until about eight quarts only remain, when a slight excess of a concentrated solution of the chloruret of calcium is to be added. The mixture having been heated for an hour, at 175° F., and continually stirred, the meconate of morphia is totally decomposed, and a white precipitate of meconate of lime takes place, which can be separated by filtration. The liquid is then passed boiling over purified animal charcoal; then concentrated, and a large excess of hydrochloric acid added, by which a confused crystallisation of hydrochlorate of morphia and codeine is very soon obtained. This salt is collected, and pressed. As it is impossible to obtain all the morphia from the syrupy mother-water by a second

crystallisation, it must be diluted with water, and boiled, when the morphia may be precipitated by ammonia diluted with water. This morphia, previously washed, is saturated with diluted hydrochloric acid, and added to the salt previously procured. The whole is then decomposed by ammonia, which precipitates almost all the morphia, leaving the codeine and some morphia in the solution. The precipitated morphia is then saturated with diluted hydrochloric acid, when the narcotine will be separated, unless an excess of acid be used; after which, the liquid having been filtered, and a large excess of hydrochloric acid added, the morphia will speedily crystallise. The collected salt is submitted to the press, and about 3-4ths of a pure white salt will be obtained. The mother-water is again precipitated by ammonia, as at first, and the same process of crystallisation is adopted. It is so speedy, that it can be practised several times in a day; whereas, previously, a day was required for each crystallisation. If other salts of morphia are required, the solution of the hydrochlorate must be decomposed by diluted ammonia. *Ibid.*

Acetic Extract of Cantharides. By M. Soubeiran.—The acetic extract of cantharides has been long used in Germany, and is considered as the best and most efficacious preparation yet made. This preparation is made in the following manner: take 4 parts, by weight, of cantharides powder; 1 part of concentrated pyroligneous acid, and 16 pints of alcohol; digest at a temperature of about 90°; express the fluid; filter and distil off the alcohol at a gentle heat. A syrup-looking extract, of a buttery consistence, is left—the acetic extract of cantharides. It is powerfully vesicant. It is only necessary to spread a thin film over paper, and apply it directly to the skin, when it rapidly causes free and full vesication. The presence of the acetic acid in this preparation prevents the cantharadine from crystallising—a circumstance which is a great inconvenience in the etherial extract, rendering its application not always certain. *Edin. Med. and Surg. Journ., from L'Expèrience.*

THE

AMERICAN JOURNAL OF PHARMACY.

JANUARY, 1844.

ART. LVI.—OBSERVATIONS ON THE VOLATILE OIL OF BETULA LENTA, AND ON GAULTHERIN, A SUBSTANCE WHICH, BY ITS DECOMPOSITION, YIELDS THAT OIL.

By William Procter, Jr.

In a former communication* the result of a series of experiments on the volatile oil of *Gaultheria procumbens* were presented, which exhibited many of the characters of that substance, showing that it possessed acid properties, and was closely allied to salicylous acid. Since that period M. Cahours has occupied himself with the same subject, and by applying the sure test of ultimate analysis, has arrived at some very interesting results. That chemist has shown† that the oil of Gaultheria has the same composition as the *salicylate of methylene*, ($C^{14}\ H^5\ O^5 + C^2\ H^3\ O$,) and that by distilling a mixture of pyroxylic spirit, salicylic acid, and sulphuric acid, a product is obtained having the properties of that volatile oil, thus exhibiting the first instance of this pyrogenous body (methylene) occuring in a natural production.

* American Jour. Pharm. for Oct. 1842.

† Jour. de Pharm. et de Chem. Mai, 1843.

M. Cahours further observes that the compound resulting from the action of fuming nitric acid on oil of Gaultheria, has the composition of indigotate of methylene, ($C^{14} H^4 N O^9 \times C^2 H^3 O$) and that chlorine and bromine appear to act on that portion of the oil constituting the methylic base. In a subsequent paper* M. C. has given the results of his observations on the ammoniacal compound of oil of Gaultheria, which are full of interest. By distilling that substance he obtained a product having the composition of salicylamid, which under the influence of strong acids and bases, regenerates ammonia and salicylic acid, and has an acid reaction.

When oil of Gaultheria is dropped on finely pulverized caustic baryta, considerable elevation of temperature occurs and a well defined crystalline compound is formed. If the baryta be in great excess, and the mixture be submitted to dry distillation, an oily matter passes over into the recipient, which is but partly soluble in a solution of potash. This substance, when purified by washing with alkaline water and dried over chloride of calcium, has the composition of *anisole*, a substance formed by the action of caustic baryta on crystallized anisic acid.

M. Cahours observes, "although presenting the composition of a neutral ether, the oil of Gaultheria behaves like a true acid. Thus treated with caustic potassa, or soda, it forms crystalline compounds, soluble in water and in alcohol; the addition of an acid separates the oil unchanged; it is only in the course of a day that the whole is converted into salicylic acid." In my experience it has taken a much longer period before the alkaline compounds of oil of Gaultheria would cease to yield that oil on the addition of an acid. Some specimens kept more than twelve months, however, were wholly changed, salicylic acid being precipitated by a dilute acid. In the case of some specimens of the

* Comptes Rendus, July 3d.

compounds of oil of gaultheria and oxide of copper and of baryta, the addition of a dilute acid eliminated the oil apparently unchanged.

Having given an outline of the principal results of M. Cahours, I wish in what follows to call the attention of chemists to the volatile oil of *Betula lenta.* The results of my experiments tend to prove—

1st. The indentity of this volatile oil with the oil of *Gaultheria procumbens* (salicylate of methylene.)

2d. To the existence of a peculiar principle in the bark of the *Betula lenta,* which bears the same kind of relation to the oil of Gaultheria or *Betula lenta,* that amygdaline bears to the oil of bitter almond; and to which I have given the name of *gaultherin,* as it gives rise to the oil of Gaultheria by its decomposition. The term *betulin* (perhaps more appropriate) has been already applied to another substance.

3d. That there exists in the same bark, associated with gaultherin, a substance enjoying the property of reacting with the latter so as to produce the volatile oil, and which is analogous in its mode of operation to synaptase, or emulsin.

The bark of the *Betula lenta* appears to be constituted much like that of the *Cerasus serotina,* (wild cherry.) It contains tannin, gum, saccharine matter, resin in considerable quantity, *gaultherin,* fixed oil soluble in alcohol, &c.

Oil of Betula lenta. The plant which yields this volatile oil is one of the most noble individuals of the American forest, both as to its gigantic size and to the various economical uses to which its wood has been applied in cabinet work, &c. It attains the height of 80 feet; and grows abundantly in the middle and northern States, and in Canada, and is known under the various titles of *sweet birch, black birch, cherry birch,* and *mountain mahogany.* The bark and leaves are embued with the odor and taste of the *Gaultheria procumbens,* and this similarity in sensible properties sug-

gested the idea of an analogous chemical constitution of their volatile oils.

Twenty-five pounds of the bark taken from the trunk and larger branches, deprived of its external layers, was coarsely bruised, macerated for several days in as much water as would cover it, and then submitted to distillation. By this treatment the bark yielded five drachms of volatile oil, besides that portion which remained in solution in the distilled liquid. Several circumstances interfered with the success of the operation, and it is probable that the amount of oil indicated is less than it might have been under more favorable auspices.

Volatile oil of *Betula lenta*, as obtained by careful distillation, is colorless, has the specific gravity 1.173, and in odor and taste closely resembles oil of Gaultheria. Like that oil, when exposed to the air, it gradually acquires a red color, of which it is easily deprived by distillation. It is also obtained colorless by decomposing its compound with potassa by a dilute acid. It is slightly soluble in water, to which it communicates taste and odor, and mixes in all proportions with alcohol and ether. Its aqueous solution is colored purple by persulphate of iron. Dropped into a concentrated solution of potassa, combination immediately ensues, with the production of a solid compound and the evolution of heat. This product, when pressed between bibulous paper to remove the excess of potassa, and then dissolved in hot alcohol, is obtained in rhombic, and six-sided tables by its evaporation. When one of these crystals is placed in contact with a drop of dilute sulphuric acid, it is at once decomposed, minute globules of oil float on the surface of the liquid, and the odor of the oil is developed. It reacts with caustic soda and baryta, and with oxide of lead and copper, in the same manner as the oil of Gaultheria.

When heated with an excess of potassa, salicylic acid is produced; and when agitated with solution of ammonia, it

is gradually dissolved; the solution depositing crystals in all respects like those from the oil of Gaultheria.

By passing a current of chlorine over the oil of *Betula lenta* it is rapidly absorbed, hydrochloric acid is evolved, and the oil gradually becomes a solid crystalline mass of a yellow color. If this be dissolved in boiling strong alcohol the solution deposits it in brilliant four-sided plates, like the Gaultheria compound, which possesses the same properties.

Bromine combines with the oil, hydrobromic acid being evolved.

By distilling the chlorine compound with iodide, cyanide, or sulphuret of potassium, compounds of the oil with iodine, cyanogen, and sulphur appear to be formed. The latter condenses as a yellow oil, which by standing becomes crystallized, and has a very fetid odor.

Ordinary nitric acid (1.40 sp. gr.) has little action on the oil when cold, but by heat a rapid evolution of red fumes occurs, and the oil is converted into a crystalline matter, having acid properties. It crystallizes in minute prisms, and combines with fixed bases to form salts, which fulminate by placing them on a hot surface. Fuming nitric acid acts unassisted by heat. Both these products appear identical with the corresponding compounds of oil of Gaultheria.

When oil of *Betula lenta* is mixed with concentrated sulphuric acid, but little change occurs, but if heat be applied, the oil is gradually dissolved, the mixture acquires a deep red color, and the odor of the oil ceases to be perceptible. If now it be allowed to stand, the solution becomes a mass of crystals, which after the removal of adhering sulphuric acid, have the properties of salicylic acid. By pressure between bibulous paper and crystalling from a hot solution in water the acid is obtained perfectly pure and white. Oil of Gaultheria yields salicylic acid under the same circumstances. If the acid be in great excess, or too much heat be applied, the operation fails. It is probable that in this re-

action the acid acts on the methylic base of the oil, setting the salicylic acid at liberty. This is an interesting fact and deserves attention.

Gaultherin.—The dry bark of the *Betula lenta* does not possess the peculiar odor of its volatile oil, which latter is only developed by the contact of water. The analogy of this fact to that of the wild cherry bark, rendered it probable that a principle existed in the bark, which by its decomposition, yielded the oil. When the powdered bark is treated with cold alcohol of 95 per cent. by maceration and displacement, until it is exhausted, the residue of the bark no longer gives an odor of Gaultheria when moistened with water. If the alcoholic liquid be evaporated to an extract, and a portion of it be mixed with a part of the exhausted bark in water, the peculiar odor of the volatile oil is immediately developed, and by distillation a liquid is obtained which is colored purple by the persulphate of iron, and otherwise reacts like the oil of *Betula lenta.*

Gaultherin does not appear to exist in the *Gaultheria procumbens.* The leaves of that plant were dried, powdered, and treated like the bark of *Betula lenta*, but they did not yield that principle. The leaves of the Gaultheria, when long kept, lose their odor, and mixture with water does not revive it, as with *Betula lenta;* hence it would seem that the salicylate of methylene is an immediate product in the *Gaultheria procumbens*, whilst in the *Betula lenta* it is secondary.

In order to obtain this principle as pure as possible, the alcoholic extract of the bark is treated with water, which leaves the resin and fixed oil. The dark red liquid thus obtained, containing tannin, extractive, and saccharine matter, is then treated with an excess of hydrated protoxide of lead, until these substances are separated, and the transparent, nearly colorless liquid obtained by filtration, is carefully evaporated. A transparent gummy mass results, which almost wholly dissolves in alcohol of 97 per cent. The alcoholic solution,

by spontaneous evaporation, yields a syrupy, almost colorless product, which does not crystallize after standing several weeks. In this state it is evidently associated with some substance that prevents its crystallization. The syrupy liquid was agitated with several times its bulk of ether, but the former separated from the mixture unchanged. The difficulty of combining gaultherin with other bodies opposes a barrier to its examination.

As thus obtained gaultherin has little, if any, odor, and a slightly bitter taste. When heated carefully on a plate of glass until all the moisture has evaporated, it remains as a transparent varnish-like layer easily pulverizable. When held in a flame it takes fire and burns tardily, with a large carbonaceous residue, and may be heated to 300° Fahr., without change; at 350° it froths and becomes darker colored, and at 400° it becomes almost black, and emits empyreumatic vapors. At the two first mentioned temperatures the composition and properties of gaultherin do not appear to be affected, but at the latter they are almost entirely destroyed. Subjected to heat in a close tube, gaultherin is completely decomposed; a yellow oil condenses on the opposite end of the tube, which possesses the properties of oil of Gaultheria, but is contaminated with pyrogenous matter; whilst a carbonaceous residue remains.

When gaultherin is mixed with concentrated sulphuric acid it is dissolved, the acid acquires an intensely red color, and the odor of the oil of *Betula lenta* is developed.

If gaultherin be distilled with diluted sulphuric acid, it is decomposed, and the distilled liquid is strongly impregnated with the oil, globules of which float upon its surface.

Distillation with dilute hydrochloric acid also generates the volatile oil.

When gaultherin is dissolved in dilute nitric acid, (sp. gr. 1.04,) and the mixture distilled, the liquid in the recipient contains no volatile oil; but floating on its surface and attached to the sides of the receiver, are numerous acicular

crystals of a pale yellow color. This substance forms a yellow solution with alcohol, which by evaporation leaves it in minute crystals of a yellow color. This substance is probably formed by the reaction in the receiver, between the nitric acid vapour and that of the volatile oil, (which is doubtless generated.) It has an acid reaction, and appears analogous to the compound formed from the oil by nitric acid. When gaultherin is mixed with fuming nitric acid and gently heated, a rapid reaction takes place, nitrous acid vapours are evolved, and a yellow solution results, which by mixture with water and standing, deposits a crop of yellowish white prismatic crystals.

The fixed alkalies and alkaline earths have a remarkable action on gaultherin, wholly destroying its power of generating volatile oil, and converting it into an acid which remains combined with the base. When gaultherin is boiled with a solution of ammonia until the odor of the latter ceases to be perceptible, the gaultherin appears to be but slightly acted on, as it reacts with the residue of the bark, producing the volatile oil.

If gaultherin be boiled for some time with hydrated protoxide of lead in water, and the solution filtered, it is found to contain lead and reacts alkaline. By adding sulphuric acid, carefully avoiding an excess, the liquid filtered from the sulphate of lead is acid, and does not contain sulphuric acid. But a small part of the gaultherin is decomposed.

The process of Piria for combining salicin with oxide of lead was tried with gaultherin, by rendering a solution of the latter alkaline with ammonia, and adding subacetate of lead. The gaultherin was thrown down in combination with the oxide of lead, but it appears to be either converted into gaultheric acid, or otherwise decomposed, as neither the liquid filtered from the precipitate, or that obtained by decomposing the precipitate with dilute sulphuric acid, would yield the volatile oil when mixed with the residue of the bark.

Gaultheric acid.—This acid is obtained by dissolving gaultherin in baryta water, boiling the solution for a short time, and afterwards passing a current of carbonic acid through the liquid until all the free baryta is removed, and filtering. A neutral solution of gaultherate of baryta is then obtained, from which the gaultheric acid may be isolated by cautiously adding dilute sulphuric acid as long as a precipitate is produced. The filtered liquid acts strongly acid on litmus, and does not precipitate baryta water. By evaporation it attains a thick syrupy consistence, and dries into a gum-like mass. In this form it is impure. By boiling it with carbonate of lead until saturated, filtering the solution, and then precipitating the lead with hydrosulphuric acid, a solution is obtained containing the acid in a much purer state, which by evaporation yields it in a nearly colorless mass, with some evidence of crystallization.

Gaultheric acid is soluble in water and alcohol, but is only slightly taken up by ether. It saturates acids, forming neutral salts which do not crystallize.

By distilling it with dilute sulphuric acid, oil of Gaultheria is obtained, and nitric acid appears to act on it like gaultherin.

The substance existing in the residue of the bark, after exhaustion by alcohol, and which reacts with gaultherin to produce the volatile oil, has not been isolated. It is insoluble in water, as by long maceration in that fluid it is not removed or changed. The temperature of ebullition entirely destroys its power of acting on gaultherin, which proves its analogy to synaptase. Maceration in solution of potassa, sp. gr. 1.05, also destroys its power. The impossibility of finding a menstruum capable of dissolving this principle, has prevented a further examination of its properties.

In the foregoing observations, some interesting facts have been elicited. The existence of a chemical compound of so extraordinary a nature as the salicylate of methylene in a

diminutive individual of the heath tribe, was indeed striking: now we have the same complex substance pervading the bark, leaves, &c. of one of the largest of our forest trees. Additional interest attaches to the latter because of a principle of a still more complex nature that exists in it, and which contains the elements of the salicylate of methylene; thus adding another to that class of neutral substances, of which amygdaline is the type.

It will be interesting to know the ultimate composition of this principle, and the relation it bears to gaultheric acid and to salicylate of methylene. Before that can be accomplished, the necessity of obtaining it in a pure state is imperative. The more important of the observations contained in this paper were made during the past spring and summer; but till recently the author has not had sufficient leisure to arrange them for publication. It is hoped that the attention of chemists will be attracted to these principles, and their character more fully developed.

Dec. 20th, 1843.

ART. LVII.—ON AN ARTICLE CALLED TEXAS SARSAPARILLA.

(*Read at the Pharmaceutical Meeting, Nov.* 6, 1843.)

By J. CARSON, M. D.

SOME time since there was brought to Philadelphia, and presented to the trade, an article entitled *Texas Sarsaparilla*. The lot in the hands of the importer was of sufficient size to render it an object to dispose of it ; but the attempt, so far as we were enabled to learn, was not successful. As the article bore no resemblance to genuine sarsaparilla, the effort to substitute it for this valuable drug must have originated in great ignorance, or else in speculation of an extremely suspicious nature. From the specimen obtained at the time, I shall give such a description of it as will enable it to be recognized, should it again make its appearance. The packages have been made to resemble those of the genuine, about a foot and a half in length, and half a foot or more in diamater; composed of long branching stems, doubled twice or thrice upon themselves, without any attachment to a head. The lower portion of the stems is as thick as a large sized quill, rough, wrinkled longitudinally, and of a dirty brown color, the upper extremity thin, smooth, and light-brown ; at irregular intervals of their length, are protuberances from which lateral branches appear to have been separated, and along the entire surface of the older and lower portions are minute fibrillæ, here and there collected in small tufts. The structure of this article is evidently *cauline*, consisting of a delicate epidermis, and a thin woody layer, very tough and fibrous, enclosing medulla. The entire substance may be crushed, but cannot without difficulty be broken transversely. To powder it is impossible. It has no odor.

The taste is very bitter and disagreeable. To one who is familiar with the structure of plants, it is at once evident that the article under consideration is composed of the stems of some climbing, twining plant, possessed of the habit of the *Rhus radicans*, which has been collected and prepared in the way described, to resemble sarsaparilla. As it is stated to come from Texas, it most probably has been collected in the forests of that country.

ART. LVIII.—SOME ACCOUNT OF GUNJAH, OR INDIAN HEMP AND ITS PREPARATIONS.

By AUGUSTINE DUHAMEL.

(*Read at the Pharmaceutical Meeting, November* 6, 1843.)

Cannabis Indica—Indian Hemp.

Botanical Description.—Cannabis Sativa. Lindley's Flora Medica, p. 299. This plant, considered identical with the *Indica*, is dioicious, annual, about three feet high, covered over with a fine pubescence : stem erect, branched, bright-green, angular : leaves, alternate or opposite, on long weak petioles ; digitate, scabrous, with linear, lanceolate, sharply serrated leaflets, tapering into a long smooth entire point ; stipules subulate ; clusters of flowers axillary with subulate bractes ; males lax and drooping, branched and leafless at base ; females erect, simple and leafy at the base. Calyx downy, five-parted, imbricated; stamens five ; anthers large and pendulous. Calyx covered with brown glands. Ovary roundish, with pendulous ovule, and two

long filiform glandular stigmas; achenium ovate, one-seeded. The fibres of the stems are long and extremely tenacious, so as to afford the best tissue for cordage. The seed is simply albuminous and oily, without narcotic properties.

For the knowledge we possess of this active remedy we are indebted to the interesting contributions of Dr. W. B. O'Shaughnessy, to the London "Provincial Medical Journal." To him is due the credit of introducing it to the medical public as a valuable therapeutic agent.

The narcotic effects of hemp are popularly known in the South of Africa, South America, Turkey, Egypt, Asia Minor, India, and the adjacent territories of the Malays, Burmese and Siamese. In all these countries hemp is used in various forms by the dissipated and depraved, as the ready agent of a pleasing intoxication. As the popular medicine of these nations it is employed in a multitude of affections. But in Western Europe its use as a stimulant or as a remedy, are alike unknown. Much difference of opinion exists on the question, whether the hemp, so abundant in Europe, even in high northern latitudes, is identical in specific characters with the hemp of Asia Minor, and India. The extraordinary symptoms produced by the latter, depend on a resinous secretion with which it abounds and which seems totally absent in the European kind. The closest physical resemblance exists between both plants; difference of climate seems more than sufficient to account for the absence of the resinous secretion and consequent want of narcotic power in that indigenous in colder countries. The Indian Hemp of the United States, *Apocinum cannabinum,* bears no resemblance to the hemp of India, and should not be confounded with it.

Physical and Chemical Properties.—In certain seasons and in warm countries, a resinous juice exudes or concretes on the leaves, slender stems and flowers. Separate and in masses it constitutes the *churrus* of Nipal and Hindostan

and to this the type or basis of all the hemp preparations are the powers of these drugs attributable. *Churrus* is collected in central India and the Saugor territory, and in Nipal during the hot season as follows: Men clad in leathern dresses, run through the hemp fields, brushing through the plant with all possible violence ; the soft resin adheres to the leather, and is subsequently scraped off, to be formed into little balls. A finer kind collected by the hand in Nipal is sold at a greater price. It is also collected in Nipal upon the skin of naked coolies. In Persia it is prepared by pressing the resinous plant on coarse cloths, and then scraping it from these and melting it in a pot with a little warm water.

The resin of the hemp is soluble in alcohol and in ether ; partially soluble in alkaline, insoluble in acid solutions ; when pure, of a blackish grey color ; hard at 90° ; softens at higher temperatures and fuses readily ; soluble in the fixed, and several of the volatile oils. Its odor is fragrant and narcotic ; taste, slightly warm, bitterish and acrid.

The dried hemp plant which has flowered, *and from which the resin has not been removed*, is call *Gunjah.*

The bundles of *gunjah* are about two feet long and four inches in diameter, and contain twenty-four plants. The color is dusky green ; the odor agreeably narcotic ; the whole plant resinous and adhesive to the touch. It is chiefly used for smoking. The *gunjah* consumed in Bengal is chiefly brought from Mirzapür and Ghazeepore, being extensively cultivated near Gwalior and in Tirhoot. The natives cut the plant when in flower, allow it to dry for three days, and then lay it in bundles, averaging two pounds weight each, which are distributed to the licensed dealers. *Gunjah* yields to alcohol 20 per cent. of resinous extract, composed of the resin (churrus) and green coloring matter, (chlorophylle.) Distilled with a large quantity of water, traces of essential oil pass over, and the distilled liquor has the powerful narcotic odor of the plant.

The preparations of Indian hemp are used by the natives

for the purpose of intoxication. In this intention they prepare a mixture of powdered *gunjah,* various condiments and milk which they drink as a certain intoxicating beverage. Powders composed of gunjah and tobacco, for smoking in a pipe are variously prepared to produce an intoxicating delirium. The intoxication lasts for three hours when sleep supervenes. No nausea or sickness of the stomach succeeds, nor are the bowels at all affected ; next day there is slight giddiness, and much vascularity of the eyes, but no other symptoms worth recording. It is said to be very fascinating in its effects, the intoxication being of a cheerful character, producing extatic happiness, a persuasion of high rank, a sensation of flying, voracious appetite, and intense aphrodisiac desire. The remarkable qualities of this drug were known to the Arabian and Persian physicians, both ancient and modern : but Dr. O'Shaughnessy could no where find any account of its administration as a remedy, of its dose, or of its exact therapeutic effects. His first step, therefore, was to institute an extensive series of experiments with it upon animals. The carnivorous animals speedily exhibited the intoxicating influence of the drug, while the graminivorous experienced but trivial effects from any dose administered. In none of these, on several other experiments, was there any indication of pain or convulsive movement. The results forced conviction upon his mind, that the resin of hemp could be used with the greatest utility upon the human subject.

Its properties are sedative and narcotic. Dr. O. S. found its chief value as an anti-convulsive remedy, in tetanus, hydrophobia and cholera.

It is used in the form of extract and tincture.

A formula is given in the London Pharmaceutical Transactions, by Mr. Savary, for the preparation of the extract, as follows:

Gunjah, finely bruised,	4lb. avoirdupois,
Rectified spirit, (0.838,)	5 galls. O. M.

Macerate the gunjah, in two gallons of the spirit, for seven days, then strain off, and add one gallon more of the spirit: let this stand four days and strain ; mix the two tinctures and filter ; then boil the hemp in the remaining two gallons of spirit, for fifteen minutes and filter whilst hot. Let all the mixtures be united, then distil off the spirit, and evaporate the remainder in a water bath, to the consistence of an extract, (product 12 oz.)

The *tincture* is prepared by dissolving three grains of the extract in one drachm of proof spirit.

Dose—From one to ten, or even twenty grains. Small doses are recommended to commence with.

ART. LIX.—REPORT ON A ROOT FOUND IN SENEGA.

Read at the Pharmaceutical Meeting, November 6, 1843.

The Committee having in charge the investigation of an article introduced into the market, associated with Senega to an extent of 33 per cent., and calculated, from its resemblance in some of its external characters to the genuine root, to deceive, beg leave to Report as follows:—

This adulteration separated from the Senega, is in long, slender, tapering roots, terminating in a knotty head, to which are attached numerous small fibres. It is branched and tortuous like Senega. The epidermis is corrugated, transversely cracked, and of a reddish brown color: it is also friable, and possesses a strong bitter taste; is entirely without acridity, and has no smell. The central portion is ligneous, reddish white, and tasteless. As all the Polygalæ have a more or less acrid taste, this cannot be one of them,

but its sensible properties and characters are the same as those of the root of the *Gillenia trifoliata.* By comparing it with the specimens of the latter contained in the cabinet of the College, their identity is placed almost beyond a doubt, and the fact that the Gillenia grows in the same localities as Senega is further evidence.

Your Committee have made diligent inquiry among the wholesale drug dealers, but have been unable to trace its origin.

From the house whence issued, the only information elicited was that it was obtained at a public sale, at a time when they were short of their usual supply. Your Committee believing that the main object (that of directing attention to its existence,) is now fulfilled, ask to be discharged.

AUGUSTINE DUHAMEL,
WILLIAM PROCTER, JR.

ART. LX.—NOTE ON ERGOTIN.

By Augustine Duhamel.

Read at the Pharmaceutical Meeting, November 6th, 1843.

The accompanying specimen of a substance termed *Ergotin* is submitted to the inspection of the Society, as the product of an experiment upon Mr. Bonjean's process, published in the last number of our Journal. A few remarks are at the same time offered, as serving to fill up the void occasioned by the want of details in Mr. B.'s directions for obtaining this substance. The occasion is also seized upon to bring in contrast two substances of opposite character, to both of which the same name has been assigned. The term *Ergotin* has been applied to two different principles contained in the Ergot; one supposed to possess all the poisonous properties,—the other, the anti-hemorrhagic action of that article.

It was first given by Mr. Wiggers (see Chemical researches upon Ergot, published in the *Annales de Pharmacie*, Vol. i., 1831) to a red powder obtained from Ergot finely reduced, and previously exhausted of its fixed oil by ether; by the action of boiling alcohol, and evaporation to the consistence of an extract; this extract, which is of a reddish-brown color and granulated, is then treated with water, which separates the soluble and larger part, leaving behind the insoluble portion. This last, the *Ergotin*, exhibits the following characters:—"It gives a reddish-brown powder of a peculiar nauseous odor, developed more particularly by heat; bitter taste and a slight acridity. It is neither acid nor alkaline; is insoluble in water and ether, but readily soluble in alcohol, furnishing a reddish-brown solution, and giving rise to a cloud of the same color by the addition of water; is discolored by chlorine, and dissolved by caustic

potash, as also by acetic acid. Heated with nitric acid, it is destroyed. It is not melted by heat, but soon burns, giving out a peculiar odor."

Mr. Wiggers further observes:—To this substance Ergot would appear to owe all the energy of its action. That all its noxious effects are due to it is proved by the physiological experiments undertaken with Ergotin. But the medicinal effects, however, of Ergot can hardly be attributed to it, since these virtues, according to many physicians, reside in the aqueous decoction, whilst Ergotin is insoluble in water.

The *Ergotin* of *Bonjean* (Jour de Pharm. et de Chim. vol. iv., 1843) is obtained from powdered Ergot by the displacement method, by the immediate action of cold water, and concentration of the product, in a water bath, to a syrupy consistence; this is then treated with alcohol to separate the albuminous matters, and the clear tincture reduced to an extract. In pursuing Mr. B.'s directions, it becomes necessary to mix the powdered Ergot with a quantity of sand, and to act upon a moderate portion only at a time. The large quantity of fatty matter, gummous, extractive, and vegetable albumen contained in the Ergot, presents an obstacle to the free and rapid percolation of the aqueous menstruum; so much so, that if a large quantity be acted upon, the putrefactive fermentation takes place before the filtration is far advanced.

This *Ergotin* is a soft extract, which does not dry, being decomposed at an elevated temperature; its color is reddish-brown; odor, that of ozmazome; taste, slightly bitter and peculiar; is insoluble in ether, but readily dissolved in alcohol and in water, forming a transparent solution, which is slightly acid. Heated, it melts, burns with flame, developing the odor of burnt bread, leaving a charcoal which burns almost without residuum.

Precisely the same characters are ascribed by Wiggers to one of the principles of Ergot isolated by him, which he distinguishes by the name of *vegetable ozmazome,* being

essentially an extract of that larger portion characterized by him as soluble in water in the process of forming *his* Ergotin.

Mr. Bonjean considers his Ergotin a specific against hemorrhage in general, and as possessing this advantage over Ergot, that being utterly freed from the poison which this last contains, the dose may be increased at will, without fear of those accidents which result from the use of the grain itself.

ART. LXI.—EXTRACT FROM MR. DESCHAMP'S MEMOIR UPON POMMADES.

Mr. D. remarks as follows:—

Struck with the very slight alteration which Poplar Ointment undergoes, I thought its preservation was owing to the resinous matter which the grease drew from the poplar buds; hence it occurred to me that the portion of benzoin soluble in grease, would likewise prevent its alteration, and an agreeably aromatized ointment be obtained. These ointments were prepared as follows:—

Benzoin in coarse powder, - -	120.00 grms.
Melted lard, - - - -	3000.00 "

Heat in a water bath for two or three hours, strain without expression, and stir from time to time while it is cooling:

Poplar buds, - - - -	500.00 grms.
Melted lard, - - - -	3000.00 "
Water, - - - - -	250.00 "

Heat in a tinned vessel until all the water is driven off, then pass through linen, and stir until it becomes cool.

After having proved that these ointments, which I have called *Benzoated and Populinated grease,* did not after several years offer any change in odor, I sought by means of proper re-agents to discover if this observation was confirmed, and to discern the difference between the prepared grease and ordinary fat bodies. I knew that red oxide of mercury was changed by the common fatty substances. I was aware of the readiness with which fatty bodies acidified when either the acetate or subacetate of lead was mixed with them. I perceived that the Iodide of Potassium might serve in the promptest manner to discover rancidity or acidity in fatty bodies, and I arrived at this conclusion by the aid of experiments, useless to detail here since the results are exhibited in the formulas which I propose—that the fatty bodies the least alterable are the *benzoated* and *populinated* greases, and immediately after follows butter melted with caution.

That the *populinated* grease, by reason of the coloring matter it takes from the buds, becomes orange colored by the agency of alkalines contained therein, or substances having similar action. That this change is limited to the coloring matter is proved by subacetate of lead, which after a very long time merely colors it without changing its normal odor.

The following Ointments may be prepared:—

OINTMENT OF IODIDE OF POTASSIUM.

Iodide of potassium, - - -	4.00	grms.
Water, - - - - - -	4 00	"
Benzoated grease, - - -	30.00	"

This ointment may likewise be prepared with populinated grease or with butter. Six months witnesses no change in this preparation.

OINTMENT OF RED OXIDE OF MERCURY.

(Pommade de Lyon.)

Red oxide of Mercury, - -	2.00 grms.
Benzoated grease, - - - -	32.00 "
Ess. oil of roses, - - - - -	2 drops.

This may also be prepared with butter, but it does not keep so well as when prepared with Benzoated grease.

MERCURIAL OINTMENT.

Eleven months have transpired since the preparation of this ointment with the populinated grease, and it is not rancid.

Lip Salve as commonly made, soon becomes rancid, loses color, and granulation ensues. Made by the following formula, it does not become rancid, or produce any disagreeable impression upon the lips.

Populinated grease, - - -	120.00 grms.
Newly melted suet, or populinated suet, - - - - -	40.00 "
Alkanet, - - - - - - -	8.00 "

Place the whole in a tinned skillet, heat at a low temperature, pass through linen, and aromatize with

Ess. oil of roses, - - - -	10 drops.

Mix and cool quickly, stirring in the mean time.

From the exposition of these facts it results:—

That the ointment of iodid. potassii can only be prepared with benzoated or populinated grease, or else butter.

That the ointment of red oxide of mercury and mercurial ointment, made with the grease thus prepared, may be kept a year without any sign of rancidity.

That the benzoated grease, by reason of its whiteness, should be preferred when the ointments are intended to be

white, or when any substance enters into their composition having an alkaline reaction.

That the benzoated and populinated greases are preferable to other fatty bodies, and that the latter resists oxidation better than any other fatty body.—*From the Journal de Pharmcie et Chimie.*

A. D.

ART. LXII.—THE PLANT PRODUCING GUM AMMONIAC.

By A. Richard.

In a magnificent work, *Illustrations of Plants of the East*, of which six livraisons have hitherto appeared in small folio, each containing ten plates, Messieurs Jaubert and Spach have described and figured, under the name of *Diserneston gummiferum*, (p. 70 to 40,) a large umbelliferous plant, found in Persia by the intrepid traveller, Aucher Eloy, and which there produces gum ammoniac. The characters assigned to this plant, of which the authors have thought that they ought to form a new genus, under the name of Diserneston, have convinced us that it is not new, as has been supposed by them. It appears to us to be the same as that already described by Mr. Don, several years ago, (Philos. Mag.) under the name of *Dorema ammoniacum*, and of which we published a very full description in the third edition of our Histoire Naturelle Medicale. For those who compare the characters that Messrs. Jaubert and Spach have given of their *Diserneston gummiferum*, it will be easy to recognize the same plant that Mr. Don has named *Dorema ammoniacum*. In fact it is a plant of which the bipinnate leaves, with very large folioles, confluent at base, re-

semble those of the *Pastinaca opponax.* The flowers have a very remarkable character; they form small umbellets, almost globose, borne upon a very short peduncle. These umbellets, instead of being united in umbels, form a kind of simple bunches, which by their reunion constitute compound bunches or a panicle. The calycine limb is prominent, and constitutes a sort of cup at the summit of the ovary; this last is covered with silky hair. Finally, the fruit is compressed and presents striæ little prominent, to the number of 3 to 5 on each face. The different characters that we have stated are common to both plants mentioned, and prove their identity.

It results from the preceding observations, that the name *Diserneston gummiferum* ought to be appended as a synonym to that of *Dorema ammoniacum,* given previously by Mr. Don, to the umbelliferous plant, which in Persia furnishes gum ammoniac by exudation. Messrs. Jaubert and Spach have, nevertheless, done an important service to Medical Natural History, by making us better acquainted with this vegetable, of which they have published an excellent description and figure.

Jour. de Chemie Med.

ART. LXIII.—ON THE MALAMBO, OR MATIAS BARK.

By Alexander Ure, Esq.

Surgeon to the Western Ophthalmic Institution, &c.

A quantity of the bark of a tree, said to have come from Colombia, in South America, was sometime since placed in my hands by Hugh Houston, Esq., that gentleman having received it from Dr. Mackay, who communicated two papers respecting it, under the name of Matias Bark, to the British Association. He there mentions his having procured from it, by distillation, two oils, one lighter than water, of specific gravity 0.949; the other denser, of specific gravity 1.028. He further obtained a brown extractive substance of an intensely bitter taste. Dr. Mackay remarked, that it had been successfully administered in intermittent fever, in convalescence from continued fever, in hemicrania, dyspepsia, and in a variety of chronic ailments, where tonics and stimulants were indicated; and that as an adjunct to diuretic remedies, it had been found eminently useful.

The so-called Matias bark is from three to four lines thick; brittle, though somewhat fibrous; emitting, when fresh bruised, an aromatic hue, not unlike that of acorus calamus. It is of a brown hue, covered with an ash-coloured tuberculous epiderm. It possesses a bitter pungent taste. With water it forms an agreeable bitter infusion; with alcohol a powerful bitter tincture. Ether extracts from it volatile oil and resin. Heated along with hydrate of potash, free ammonia is disengaged, indicating the presence of an azotized principle. It is without astringency.

It appears to coincide, as suggested to me by M. Guibourt, both in regard to physical and sensible qualities, with Malambo, the Indian name for the bark of a tree which grows

in New Granada, and which is held in high esteem among the natives as a febrifuge and stomachic.

Malambo bark was analyzed by M. Cadet Gassicourt, about twenty-eight years ago (*Journ. de Pharmacie,* tom. ii. p. 172); subsequently, by M. Vauquelin, who ascertained the presence of three distinct substances: namely, 1. An aromatic volatile oil. 2. A very bitter resin. 3. An extract, soluble in water, which yeilded ammonia, when heated with caustic potash (*Annales de Chimie,* tom. xcvi. p. 113). It afforded no tannin, scarcely a trace of gallic acid, and none of the alkalis of cinchona. It is stated, that in the countries where the tree is indigenous, incisions are made in the bark, and there exudes an aromatic oil which sinks in water. Most authors believe it to be the produce of a species of *drimys;* but M. Bonpland regards it as a *quassia* (*Merat et de Lens, Dictionnaire de Mat. Med.,* tome iv., p. 199.) This, however, is improbable, since none of the quassia tribe yet discovered are possessed of aroma.

The above Colombian bark has been frequently administered by me as a substitute for cinchona with good effect. It offers the useful combination of a tonic and aromatic; and seems to exercise its beneficial influence on the principle laid down by Professor Schultz, with regard to other therapeutic agents of the same class, namely, in promoting an increased flow of bile, whereby digestion is perfected, and healthy blood formed. In scrofulous ophthalmia, after removing feculent accumulations from the bowels, I have known an infusion, made with two drachms of the bark to a pint of water, cause a speedy and complete removal of the inflammation and morbid sensibility of the eyes. The dose of the infusion just mentioned is from one to two ounces, repeated twice or thrice in the course of the day. It may, in some instances, be advantageously conjoined with salts of iron, or of mercury, with both of which it is compatible. The addition of a little syrup of orange-peel, and compound tincture of cardamom forms a draught by no means disagreeable. *Pharm. Journ.*

ART. LXIV.—ON THE NATURE AND PROPERTIES OF A LIQUID SOLD UNDER THE NAME OF TER-CHLORIDE OF CARBON.

By Alexander Ure, Esq.

In the London Lancet of July 15, 1843, is a paper by E. W. Tuson, Esq., F. R. S., Surgeon to the Middlesex Hospital, "On the Effect of the Ter-Chloride of Carbon." That gentleman states its having proved beneficial in relieving the pain, and destroying the fetor of the discharge, of cancerous sores, besides producing other peculiar effects of an advantageous nature. He further extols its employment in cases of senile gangrene, sloughing ulcer, uterine and neuralgic affections, and in some instances of severe sickness after the usual remedies had failed. "It allays nervous irritability, removes anxiety of mind, invigorates and raises the spirits, and where patients have one day been in a state of complete misery, they have on the following one become happy and joyful from its effects."

"The ter-chloride of carbon," continues Mr. Tuson, "is a clear transparent fluid, smelling strongly of chlorine, as its name implies; it consists of three parts of chlorine and one of carbon, the dose from one to four drops in water, two or three times a day; one to two drachms to a pint of water as an injection or lotion."

Not being acquainted with any *ter-chloride* having the composition above assigned, or of any mere compound of chlorine and carbon, which is soluble in water, I was induced for information to refer to the work of Berzelius. In vol. i. p. 131, of the Brussels edition, we find described:—

1. A combination of one atom of carbon with three atoms of chlorine. This is a solid substance devoid of color or taste. Its specific gravity is nearly twice that of water. It enters into fusion at 320°, and boils at 356° Fahr. It does

not dissolve in water, either cold or hot, but is soluble in alcohol, and still more so in ether. These solutions are not affected by nitrate of silver.

2. A compound of one volume of carbon and two volumes of chlorine. Its specific gravity is 1.5526. Although liquid, it is *insoluble* in water.

3. A combination of equal volumes of chlorine and carbon. It occurs as a sublimate. It too is *insoluble* in water.

In order to ascertain the properties of the liquid referred to in Mr. Tuson's paper, I sent for a small quantity of the so-called ter-chloride. It possessed an ethereous character, mixed freely with water having a specific gravity of 0.882, boiling at a temperature of 170° Fahr., exhibiting an acid reaction with moist litmus paper, and affording a white precipitate on the addition of nitrate of silver. It is, therefore, totally different from any of the compounds heretofore described as chlorides of carbon, but bears a strong resemblance to what is sometimes termed chloric ether, a preparation which has, I believe, been for years usefully employed as an agreeable internal stimulant.

With the view of testing the topical efficacy of the preparation in question, I tried it in three cases; but regret to state, that the results obtained were by no means encouraging. Upon the 2d of August last, I prescribed for a patient, laboring under ulcerated cancer of the tongue, a lotion composed of one drachm to a pint of water. Here it produced no benefit beyond that of a simple detergent. The patient died after suffering excruciating agony at the end of the month.

Upon the 12th of August I ordered a similar lotion, in the hope of procuring some sedative effect in the instance of a gentleman under my care, who for several years past has been afflicted with extensive and obstinate erosive ulceration of the skin surrounding the throat, and which is accompanied with most distressing itching and irritation. Under its use, however, the whole throat became perfectly raw, the dis-

charge copious, and his sufferings from soreness and itching were extreme, so that after persevering steadily for three days, he was obliged to give it up.

About the same period, I was consulted by my friend Mr. French, of Great Marlborough Street, respecting a patient of his who had a cancerous sore upon the right leg. Here I advised a trial of the above lotion; but after applying it assiduously during three consecutive weeks, no improvement could be perceived. *Ibid.*

ART. LXV.—NOTICE OF THE METHOD OF DETECTING ARSENIC BY MEANS OF COPPER, PROPOSED BY M. HUGO-REINSCH.

By Louis-Victor Adouard of Beziers.

In the number of the "*Journal de Chimie Medicale*" for January, 1843, M. Hugo-Reinsch proposes a new method for detecting arsenic, which he assures us rivals in sensibility the process of Marsh. To convince myself of this fact, the following experiments were undertaken.

Dr. Guy had employed with success at Beziers, Fowler's arsenical solution in certain eruptions. A smith, aged 30 years, by the advice of his physician, took this solution for several days, commencing with two drops morning and evening, and increasing to twelve.

I requested the smith to send me the urine which passed at night and morning, or after each dose of the arsenical solution. I received in a bottle 1200 grammes of urine, perfectly limpid, and slightly acid.

This I divided into two parts; one part was treated by Orfila's process—viz. incineration with nitrate of potassa.

This afforded a solution, which gave by Marsh's process an arsenical ring in a glass tube, and spots of the same nature on porcelain; pure materials being used in the process.

On the other hand, the second part of the urine was treated as proposed by M. Reinsch. The liquid was placed in a porcelain capsule, and reduced by evaporation to one-third; on repose, a considerable deposit was formed. To this liquid 200 grammes of pure hydrochloric acid was added; the deposit was immediately dissolved, and the liquid became of a deep brownish red color. Heating the liquid to ebullition, two plates of copper, perfectly clean, were placed in it, and retained for ten minutes. This being without effect, boiling was continued for half an hour, but with a similar result. The plates withdrawn from solution, washed and dried as directed by M. Reinsch, were not covered with a coating of an *iron gray* color; they were brownish, from a coating of brown oxide. One of the plates introduced into a glass tube, and heated, did not yield the least trace of arsenious acid.

These experiments appear to demonstrate, in opposition to the assertions of M. Reinsch, that this method does not rival in delicacy that of incineration by nitrate of potassa, or probably that of carbonization by sulphuric acid, although loss is sustained in both these latter operations.

M. Reinsch asserts, that the method by copper, will detect the millionth of 0.050, equal to the 20,000th of 0.001 of arsenious acid. Many experiments made, in which different quantities of arsenious acid had been added to urine, soup, water, &c. enabled me to perceive very distinctly, on the copper, the *iron gray* color, and to obtain afterwards, in a tube, appreciable quantities of arsenious acid, but only when about six-twentieths of 0.001 of the acid was added to the liquid; or the great diversity of six-twentieths, instead of the twenty thousandth of a millegramme.

I may add, that the method of M. Reinsch, has the serious inconvenience of introducing a salt of copper into the

liquid operated on. To confirm this, it is only necessary to evaporate to dryness the liquor treated by copper and hydrochloric acid; calcine the residue, and dissolve in nitric acid, and a considerable amount of distilled water. A solution will be obtained, which will readily demonstrate the presence of copper, by means of ammonia, clean iron, and ferrocyanide of potassium.

Journ. de Chim. Med.

ART. LXVI.—PRACTICAL OBSERVATIONS ON LEAD PLASTER.

By DAVALLON,

Professor in the School of Medicine and Pharmacy, at Lyons.

THE great consumption of lead plaster has led to considerable attention to practical modifications in the process of its manufacture.

In the *Journal de Pharmacie de Midi,* my friend M. E. Manchon, has published some interesting details on this point; but his conclusions are in opposition to the observations which I have made on this preparation.

The principal constituents are lard, olive oil, litharge, and more or less water; this latter serving not only as a water bath to prevent too great a rise of temperature, but also to favor the reaction between the oxide of lead and the oil.

On consulting the older works on pharmacy, it will be perceived that the precise amount of water is not determined, but all agree in separating as much as possible all which remains in the plaster without being combined.

Lemery, among others, explains the process in the *Pharmacopée Universelle*, as follows :—

"If the quantity of the decoction prescribed does not suffice to finish the preparation of the plaster, more must be used ; but none must remain, for the moisture would prevent the plaster from being of good consistence, and consequently not adhesive : that is to say, not spreading well on leather or cloth.

"If then the plaster still boils, although solid and cooked, it is a sign that some of the decoction yet remains ; this is to be evaporated, and then the plaster retained for half an hour at a gentle heat, continually stirring with a wooden spatula, so as to render it dry and more adhesive."

I had not attended to this observation of Lemery, when accident led me to recognize its correctness. On preparing the simple plaster in the laboratory, it wanted but a few minutes of being finished, but the water was deficient, and the temperature rose, some portions were decomposed, communicating a brown tinge to the mass, but not sufficient to prevent its employment. This plaster when spread on cloth possessed (whiteness apart) all the properties of an adhesive plaster, viz. suppleness, brilliant aspect, and above all, the advantage of keeping for a long time without contracting that strong odor which lead plaster obtains after some time.

From that time I have gradually diminished the amount of water directed by the Codex, and after several trials have adopted the following formula :—

Lard, olive oil, - - - - - -	5000
Litharge, - - - - - - -	5000
Water, - - - - - - -	1800

This quantity of water added at the commencement, is always sufficient. The operation to be performed on a fire of such activity as to keep up ebullition, without interruption, for two or two and a half hours. The appearances are

the same as when twice or thrice the amount of water is used, except that the puffing up is less considerable.

In every case, by experience it will readily be learned when it would be prudent to add a little water to complete the preparation. The water is not totally evaporated until the plaster sinks down, and slightly fuliginous vapors arise.

Before speaking of the advantages which this method presents, it will not be useless to add that there is one circumstance on which success essentially depends. The olive oil should be pure: adulterated, as it frequently is in commerce, but an imperfect product will result, and which cannot be used, as some of my friends have found to their cost.

I may likewise add that the quantity of water indicated would probably suffice for a larger amount of plaster; but in preparing less there would be a risk of burning if the water were diminished in proportion to the other ingredients. It is evident that for 5, 10, or 15 kilogrammes of matter, the evaporation of the water would present but slight differences, as the time of the operation would remain nearly the same.

It is recommended to pour upon the plaster, when made and hot, some cold water, for the purpose of cooling, and to facilitate the kneading: this water dissolves the glycerine, or sweet principle, produced by the reaction between the oil and oxide of lead. Formerly this principle was not separated, as not injurious; on the contrary, I think that it contributes to give suppleness, the adhesive state of which Lemery speaks. This washing would then be injurious. If then no water be added, if little or none remain when the process is complete, kneading becomes useless; and in all cases is not the kneading improper? Does it serve any other purpose than to intermix minutely throughout the plaster, air and water? The presence of these two agents would tend to determine part of the rancidity, as is seen in fatty bodies, of which the surface remains exposed to the air.

There is, then, a real advantage in not washing the plaster, and in consequence in not kneading it.

It should be, while hot, run into wooden moulds to cool slowly, by which any uncombined litharge may precipitate, and the excess of water rise to the surface.

Thus prepared, the plaster may be spread without any other addition except of olive oil, when the weather changes from hot to cold, in which case the addition should be made before and not after melting the plaster. Heated together, the union is more intimate. It is an incontestable fact that fatty matter in the plaster, but not combined, favors rancidity, and it may be supposed that it is this rancidity that gives irritating properties to the plaster when spread.

Ceruse, which is sometimes added, if not hurtful, is at least useless : it is not of consequence that the whiteness of the plaster be more or less striking, provided it answers the purposed for which it is used.

The practical observations which precede, have the sanction of experience, as more than one pharmaceutist at Lyons has adopted and recognized the utility of the process.

I believe we may draw the following conclusions :—

1. Simple plaster may be prepared with less water than is usually employed.

2. This plaster is the more supple, adhesive, and shining, as there remains less water interposed.

3. Glycerine aids to maintain the plastic state, which renders useless the addition of oil, to prevent cracking.

4. Washing and kneading are injurious : the one dissolving and separating the glycerine, the other interposing air and water, which disposes the plaster to become rancid.

5. Finally, if cold weather should necessitate the addition of oil, this should be added before liquefaction.

Journ. de Chim. Med.

ART. LXVII.—TREATMENT OF HOOPING COUGH BY COCHINEAL.

Dr. Cajitan Wacht of Vienna, has treatednine children affected with hooping cough, by cochineal, which has been already used for that purpose by English physicians. The medicine has been administered in every stage of the disorder, and its efficacy has been so very instantaneous, so constant, that notwithstanding, the small number of cases Mr. Wacht had, he believes himself authorised to announce cochineal a specific in hooping cough. The following is the mixture he used :

Cochineal	10 decigrammes.
Sugar	32 grammes.
Warm Water	192 grammes.

Dissolve. Dose, 3 teaspoonful during the 24 hours.

It should not be used after it has been made 36 hours, decomposition having then commenced.

Journ. de Med.

Note by Translator.—The mixture commonly used in this country, is formed of Cochineal ℈j., Salt of tartar ℈ij., Water 4 oz. Dose a teaspoonful. From Mr. Wacht's statement above given, it would appear, that its agency in the cure of hooping cough, is due to the cochineal alone.

A. D.

ART. LXVIII.—UPON THE SARSAPARILLA OF BRAZIL.

By A. Richard.

Brazil, from the extent and variety of provinces pertaining to it, is undoubtedly one of those countries that furnish the greatest number of useful medicines. Already, many learned naturalists, at the head of whom, are to be placed, MM. Auguste St. Hilaire, Martius, Riedel, &c. have made us acquainted with a great number of the treasures which therapeutics can draw from this beautiful country. May we not hope, that young Brazilians, animated with the desire to become useful to their fellow citizens, will hasten to enter the path that has been opened to them by the European naturalists who have visited the different parts of the Brazilian empire, and will collect gradually all the materials necessary for the preparation of a medical, and economical natural history of that country.

Among the medicines that commerce has brought from Brazil, is one with respect to which we have (at least in France) but an incomplete account; this is the kind of sarsaparilla called *Portuguese* or *Brazilian.* This kind is now so much diffused in commerce, that it is scarcely of higher price than the Mexican. The fibres are very long, cylindrical, rugose longitudinally, presenting lateral fibrillæ. Their color is brown, or sometimes very deep gray, bordering upon black. This difference evidently depends upon the nature of the soil in which the plant has grown. The color internally, is nearly white. Its taste is insipid, a little mucilaginous, and slightly bitter. This last flavor only developes itself when the root has been kept some time in the mouth.

This root generally comes from the provinces of Para and Maranhas. It is in cylindrical bundles of some length, and closely wrapped with a band, which goes from one end to

the other. The fibres are separated from the heads. Those that exist sometimes are pretty large and knotted; the base of the stems that adhere to them are connected with one or two, from which the fibres go off equally. The stem itself, from the size of the little finger to that of the thumb, presents a great number of short thorns, thick at base, compressed laterally, and arranged in longitudinal and parallel lines.

A similar arrangement is observable in the heads of the sarsaparilla of Mexico.

From the researches of MM. Martius and Grisebach, this root is that of the *Smilax papyracea* of Poiret, (Encyc. Meth. iv., p. 467.) This species was at first confounded either with the *Smilax officinalis* of Kunth, or the *Smilax syphilitica* of Humboldt, which are different, and which grow in Brazil. Dr. Grisebach (in the great Brazilian Flora, published by MM. Martius and Endlicker, article *Smilaceæ*,) has given a complete description and an excellent figure of this species. It is an undershrub, the stem of which is compressed and angulated inferiorly, and armed with spines upon the angles. The leaves are elliptic, acuminate, marked with three longitudinal nerves. This species grows principally in the neighborhood of the river Amazon and upon the banks of its tributaries. It is known in Brazil by the names *salsa*, salsaparilla, sarza'-zarza, &c.

Beside this species, which really furnishes the sarsaparilla in European commerce under the name of Brazilian or Portuguese, Brazil possesses the *Smilax officinalis*, which grows in the province of Mines; the *S. syphilitica*, growing in the northern regions, and three other species—the *S. japicanga*, *S. brasiliensis*, and *S. syringoides*, the roots of which are used by the inhabitants of the provinces where they grow for the same purpose as those of the *S. papyracea*.

Finally, the same family of *Smilaceæ* or *Asparagineæ*,

furnishes, also, in Brazil, another plant (*Herreria salsaparilha*) a shrub that abounds in the provinces of Rio de Janeiro, of Bahia and of Mines, the root of which has the name of wild sarsaparilla (*Salso do Mato.*) This kind is not met with in commerce. *Jour. de Chimi. Med.*

ART LXIX.—EXTRACTION OF SANTONINE.

Mr. Calloud having put into practice the different processes indicated up to the present time, for obtaining *Santonine*, has been induced to adopt the following, which in part is due to him.

30 kilogr. of semen-contra (Sem. Santonici,) are to be placed in a large kettle, with a sufficient quantity of water, and heated ; after ebullition has taken place, add enough of slacked lime to saturate the santonine, and at the same time, fix the principal part of the coloring water. Submit the product to the action of the press, and put back the residuum into the kettle, and exhaust with a new part of hot water ; express anew, unite the decoctions, allow it to deposit, decant the liquid, which you transfer to a large dish, and evaporate to a certain degree of concentration, clarify and pass through a flannel. This done, replace the liquid upon the fire, and evaporate again to a convenient degree, then pour it into a large earthen pan, and add a slight excess of hydrochloric acid. After twenty-four hours of repose, the *Santonine* will be found more or less pure. By means of weak alcohol, wash it, to separate the larger part of the fatty resinoid matter ; express the residue, and treat it with boiling alcohol and charcoal, that it may crystallize.

The acid mother liquor, still holding in suspension a cer-

tain quantity of *Santonine,* should be saturated, with milk of lime, and evaporated again.

Santonine is a principle *sui generis,* approaching somewhat in character the concrete volatile oils, or *stearoptenes.* It is presented in the form of brilliant crystals, which are elongated, quadrilateral tables ; inodorous, and almost insipid, arising from its little solubility, requiring five thousand times its weight of cold water to dissolve it. Its solution in alcohol has a very decided bitterness.

According to Mr. Calloud, *Santonine* has a special mortal action upon the *lumbricoides,* he having administered it to hundreds of children with such a success as to exceed his expectations. The insipidity of this substance, causes it to be preferred to the oil of the semen-contra, which is excessively acrid. Mr. C. associates it with sugar, and gives it in the form of lozenges.

The dose is 30 to 50 centigrammes a day. Each *tablette* should contain $2\frac{1}{2}$ centigrammes of active matter. A. D.

Bulletin de Therapeutique.

ART. LXX.—ON THE ACTION OF NITRIC ACID ON ALCOHOL, AND ON NITRIC ETHER.

By M. Millon.

All attempts, to the present time, to effect a combination of nitric acid with ether have been unsuccessful ; exhibiting a very peculiar hiatus in the midst of the compound ethers ; and the absence of this compound was rendered still more remarkable by the discovery of a nitrate of methylene.

The effect produced on the mode of oxidation of metals, by the admixture of nitrous acid with the nitric, caused a sus-

picion, that the production of nitrous acid, would likewise modify the oxidation of organic substances, by means of nitric acid. In fact, I have succeeded in changing completely the action of nitric acid on alcohol, by preventing the production of nitrous acid. To effect this it is only necessary to add a little nitrate of urea, to the mixture of acid and alcohol; there will then be obtained, by a naked fire, a calm and regular distillation, instead of the tumultuous action which characterizes the ordinary action of nitric acid on alcohol; and the numerous products, among which nitrous ether is preeminent, are replaced by a single new product, nitric ether, which passes into the receiver, accompanied by alcohol and water.

The nitric acid should be carefully purified; the presence of hydrochloric acid renders the nitrate of urea totally ineffectual, and the common action of nitric acid and alcohol will result.

The proportions of acid and alcohol are not indifferent; the operation always succeeds very well, by taking one measure of concentrated nitric acid, containing $4\frac{1}{2}$ equivalents of water, density 1.401, and 2 measures of alcohol of 35°, making nearly an equal weight of acid and alcohol.

If equal measures of acid and alcohol be used, the nitate of urea will again fail.

It is, besides, proper not to act on too large a quantity of material, and the mixture should not exceed 150 or 200 grammes; one or two grammes of nitrate of urea will then be sufficient to regulate the process.

The heating should be moderate; the first product of the distillation is weak alcohol; but the nitric ether soon becomes perceptible by its peculiar odor, and on adding water to the distilled product, separates as a liquid heavier than water. After some time, the nitric ether is so abundant, as to form a dense layer in the receiver.

If the process be pushed until all the mixture of the alcohol and acid in the retort has been drawn off, then the tu-

multuous reactions of the alcohol take place towards the end of the operation. But by arresting the process, when about the eighth part of the mixture remains, the nitrate of urea remains undecomposed, and is soon deposited by the acid liquor ; the residue may serve for a second, third, or even a fourth operation.

If the nitrate of urea which is employed be colored, it is recovered of a perfect whiteness. We may thus combine the purification of the nitrate of urea, with the preparation of nitric ether ; for this purpose, crude nitrate of urea, such as is obtained by precipitation from very concentrated urine by nitric acid may be used ; the precipitate is expressed, and introduced into a mixture of nitric acid and alcohol. Distillation is to be carried on until the nitrate begins to form crystalline plates, on the surface of the liquid. Nevertheless, the decoloration is not satisfactory, if the weight of the nitrate of urea exceeds 50 or 60 grammes.

As to the purification of the ether, it is analagous to that of formic, and a number of compound ethers. The ether is washed with an alkaline solution, then with distilled water, after which it is left in contact with fragments of chloride of calcium for a day, and distilled.

This ether has been analysed, having been previously dissolved in alcohol, and precipitated by water.

The analysis gave the following numbers :

	I.	II.	III.	*Calculated.*
Carbon	26.59	26.50	"	26.32
Hydrogen	5.89	5.72	5.83	5.48
Nitrogen	15.07	15.26	"	15.54
Oxygen	"	"	"	52.65

Combustion with oxide of copper is readily effected. The determination of nitrogen requires several precautions, in which the paper of MM. Dumas and Peligot on wood spirits is an excellent guide.

The formula of nitric ether may be expressed thus :

$$NO_5,C_4H_5O$$

A concentrated aqueous solution of caustic potassa is without action on nitric ether ; but an alcoholic solution decomposes it, even in the cold, and abundant crystals of nitrate of potassa are formed, without the least mixture of nitrite.

Its odor is sweet and mild, but not resembling nitrous ether.

Its taste, very sweet, leaving behind a slight bitterness.

Its density, greater than water, is 1.112 at 17° C. (62° F.); it boils at 85° C. (185° F.)

It burns with a very white, and bright flame.

At a temperature little above its boiling point it is decomposed.

Concentrated nitric acid destroys nitric ether; and some attempts made to obtain nitrovinic acid, or the nitrovinates, were not satisfactory.

Hydrochloric acid likewise destroys nitric ether, aqua regia being formed.

Sulphuric acid containing an equivalent of water, dissolves one-fourth of its weight of nitric ether, without, if the ether be gradually added, any phenomena appearing at first; but after a short time the mixture gives off vapours of nitric acid, and still later, heats greatly with the production of nitric oxide ; the sulphuric acid blackens, and all the ether is destroyed.

Iodine dissolves in the ether, and communicates a beautiful violet color.

Chlorine attacks it promptly ; but I could not separate any definite product as the result of this action ; whether that the chlorine produced a complete separation of the elements, or the hydrochloric acid formed likewise, entered into the action, and complicated the phenomena.

Nitric ether is wholly insoluble in water ; one thousand parts does not essentially diminish one part of the ether ; on the contrary, it dissolves in every proportion in alcohol, from which it is readily precipitated by a small quantity of water.

The intervention of nitrate of urea, in the production of nitric ether, is explained by the action of the urea on nitrous acid ; these two bodies mutually decompose each other, giving rise to equal volumes of nitrogen and carbonic acid. So that the urea prevents the formation of nitrous acid.

The primitive action of nitric acid on alcohol, is that of all volatile acids, viz., the production of a compound ether : but nitric ether is decomposed, or rather its formation within moderate limits, is accompanied by a slight production of nitrous acid, immediately effecting a new action ; and as the temperature rises, complicated reactions take place between the alcohol and nitric acid.

Thus, it is only at the moment when the nitrous acid mixes with the nitric, that there is developed the changes which we are accustomed to attribute to nitric acid itself. We may even say, that this latter is not the sole or even the direct cause of the tumultuous action, but it is only the source of the nitrous acid. In a word, it is with alcohol as with the metals, in regard to nitric acid and aqua regia. We there find ourselves observing mixed reactions, of which we should carefully distinguish the terms and appearances. Although this analysis of phenomena may appear minute, it is not the less indispensable for obtaining a clear idea of what appertains to each reagent, that is to say, to each particular chemical force.

Ann. de Chem. et de Phys.

ART. LXXI.—UPON THE ACTIVE PRINCIPLE OF THE GASTRIC JUICE.

By M. Payen.

Mr. Blondlot has been willing to offer me the occasion of repeating his fine experiments, and place at my disposition the gastric juice obtained by his ingenious mode,* for the chemical experiments I would undertake.

I hastened to accept this twofold proposition, and the reactions described in Mr. Blondlot's treatise were reproduced with signal success. Operating in a comparative manner, I proved without difficulty the following phenomena, under the influence of the gastric juice and a sustained temperature, during eight hours between 36° and 39° Cent.

1st. Cooked meats, *boiled beef* and *ham*, were disaggregated to such a degree as to be reduced, by slight agitation, to a pulpy substance containing small fibrils.

2d. *Ichthyocolla* was disaggregated and partially dissolvèd, the solution having lost its gelatinous form.

3d. Slices of dry cowhide cut perpendicularly with the surface of the epidermis, suffered disaggregation, a large portion of the cellular tissue dissolving, showing the hair disengaged and crossing the epidermis.

* To obtain the gastric juice in abundance and in a state of purity, Mr. B. established a permanent communication by means of an artificial opening in the stomach of a dog, which enabled him to penetrate and withdraw at pleasure either the gastric juice or alimentary matters, in the different stages of digestion. His efforts were crowned with success, and the animal upon which he made his first trials, more than two years ago, still lives. Though of inferior size, he could furnish on a single occasion more than 100 grammes of gastric jujce.—*Recherches sur les phénoménes de la digestion, et spécialement sur la composition de suc gastrique.*

4th. White and diaphonous *gelatine* was dissolved, no longer recovering its gelatinous form upon cooling.

The same substance in equal volumes, placed in water, acidulated with hydrochloric acid in a manner to present evidently the same acidity, did not experience, after eight hours of contact at a temperature of 36° to 39°, the least appreciable change; the muscular tissues had preserved their form and a great resistance, and the gelatine took upon cooling the form of a firm and transparent jelly.

To these corroboratory experiments I was happy to observe, in addition, the direct action of the juice of the stomach upon a portion of compact bone. Two cylinders were prepared of equal dimensions (diameter, 7 millimetres, height, 32 mm. 1.) One of these two wrapped up in a gauze, stitched and retained by a thread, was introduced into the stomach of the dog, which remained in my laboratory for 50 hours: at the end of this time the plug was withdrawn, and the thread attached to it brought out with it, the cylinder still enveloped but so lessened in all its dimensions that its least diameter was then only 4 mm. 6, and its height 28 millimetres; the total weight had been reduced from 2 gr. 780 to 1 gr. 005. It will be easy to judge of these effects by comparing the intact cylinder with the cylinder in part digested, which I have presented to the Academy. This latter, it should be remarked, had preserved its first solidity: the angles of the base were rounded off, the superfice was striated with slightly projecting lines corresponding, doubtlessly, to the osseous parts where the texture is closer: hence it is evident that the action of the gastric juice disaggregates, by peripheric layers, the whole of the osseous substance, whilst, as every one knows, bones dipped in weak hydrocloric acid allow their calcareous salts to be dissolved, and exhibit, after the reaction, their organic tissue *hydrated*, rendered flexible and supple.

This last and curious verification of the results announced

by Mr. Blondlot, encouraging me to profit by his obliging offer, I took up again the experiments made some years ago under less favorable circumstances, and which it may be useful to recapitulate.

Mr. Valentin had offered to my learned friend Mr. Magendie to repeat, in his presence, the experiments upon artificial digestion, by means of what was then called by Mr. Schwann, and since him, by Mr. Muller, *pepsine*.

This substance, the discovery of which had fixed the attention of the *savants* of Germany, was supposed to be contained in a weak solution of hydrochloric acid which had been placed in the stomach of a calf during several hours. The experiments took place in the College of France; a stove of even temperature was employed, and several substances were tried, particularly muscular tissue and coagulated albumen, in the digestive liquid comparatively with acidulated water, for 12 hours.

The examination of the results was made by Messrs. Magendie, Valentin, Poisseuille, several others, and myself. All the results were found negative; the meat remained hard and the albumen preserved the angular forms of all its fragments. Mr. Valentin attributed the want of success to the weakness of the acid used, which threw off less vapours than the one employed by Mr. Schwann.

Upon these indications I made some new experiments, but found it impossible to obtain positive effects, or extract by Mr. Schwann's process, or others which I essayed, any principle to which could be assigned the special property in question. Having now the disposition of a normal gastric juice endowed with great energy, I hope to be more successful; and in fact, from the first attempts in the direction which I had formerly followed in vain, I have succeeded in isolating a white or delicately amber colored substance, diaphanous, very soluble in water, easily dried, and so very active that it will disaggregate more than three hundred

times its weight of the muscular tissue of boiled beef, and much more rapidly than could be effected by the gastric juice itself.

The term *pepsine* does not answer to apply to this active substance, since it is not only when the animal is hungry that it is secreted, but at the moment the aliment stimulates the stomach: for this reason I think proper to give to it the name of *gasterase.*

If I do not now make known the means of extraction, it is in the hope to give them less imperfect, and to join to them the results of an analysis which may better determine the nature and limits of action of this active principle. A. D.

Journal de Pharmacie.

ART. LXXII.—ON THE PREPARATION OF PURE IODIDE OF POTASSIUM.

By Messrs. Thos. and H. Smith, Edinburgh.

Of the value of the various processes which have been recommended for the preparation of the iodide of potassium, in reference to their facility of preparation, economy, and suitableness for the production of a pure salt, we do not feel ourselves qualified to give an authoritative judgment; we are, however, inclined to give the preference to that adopted by the Colleges of London and Edinburgh, which is grounded on the double decomposition of the iodide of iron by a solution of the carbonate of potash; but by proceeding in the way recommended by these colleges, a pure salt cannot be obtained, except by a tedious process of crystallization and recrystallization, or by dissolving in alcohol, and thus separating it from those impurities insoluble in that menstruum,

but this is an element in the process which, as it adds very materially to the cost, and is to a great extent unnecessary, will not be generally adopted.

For the preparation of the compound under consideration, we use a glass flask, capable of containing six imperial pints and having filled it to within a sixth of its capacity with distilled water, previously boiled and cooled, pour out into a bason so much as to leave the flask half full; our reason for this is, that we may have a measure of the quantity of water for dissolving the alkaline carbonate, so that we may be able to pour the solution into the flask at once, and without hesitation.

The carbonate of potash we use is prepared by heating to redness crystallized bicarbonate of potash, so as to expel the excess of carbonic acid; but as it is most important that we should use a pure salt, we test its purity, before considering it fit for our purpose ; having, therefore, dissolved thirty or forty grains in distilled water in a test glass, and acidulated with an excess of nitric acid, we add first nitrate of silver, and then nitrate of baryta, or chloride of barium. If these merely produce an almost imperceptible haze, we do not consider the salt unfit for the end in view; but, if the reaction be more decided, we reject the specimen as altogether unfit for our purpose; if the solution of a fresh portion stand these tests, after neutralizing with ammonia the excess of nitric acid previously added, it will be still more suited to the proposed end.

The Edinburgh College orders a pure carbonate prepared from cream of tartar by ignition; and Dr. Christison, in his Dispensatory, supports it in this preference, for the alleged reason that the carbonate prepared in this way is cheaper than that prepared from the bicarbonate; but this is not the case, as may be easily proved by calculation. Thus, the equivalent of bicarbonate of potash is 100.39; that of the anhydrous carbonate is 69.27; consequently 16 ounces of the first by ignition produce 11.04 ounces of the second. Again,

as the equivalent of the acid tartrate of potash is 189.11, one pound of this on being ignited cannot produce more than 5.86 ounces. Now, since 11.04 ounces of carbonate obtained from sixteen ounces of the bicarbonate cost 1*s.*, which is about the price per pound of the latter, a pound will cost 1*s.* 5½*d.*; whereas one pound of cream of tartar at 10*d.* per pound, producing only 5.86 ounces of pure carbonate, each pound of it obtained in this way must cost 2*s.* 3*d.*, being 9½*d.* per pound dearer than that obtained from the bicarbonate; besides, the time and trouble required in preparing a pure salt from cream of tartar is very much greater than when the bicarbonate is used. For these reasons, when we can obtain a pure bicarbonate, we use it in preference.

Having proved its purity, we put 7¼ ounces troy, reduced to coarse powder, into a crucible, and heat it for about half an hour at a low red heat, and, after it has cooled sufficiently, weigh out four ounces, and dissolve in the water poured from the flask into the bason, and the rest in two or three ounces of hot water in a test glass or phial.

Previous to this we have prepared the solution of iodide of iron; for this purpose we add nine ounces troy of iodine to the water in the flask, and then three ounces troy of pure iron filings, the iron being in the same proportion to the iodine as in the formula of the London college; frequently a much larger proportion than this is recommended: so much even as double the weight of iodine: but the above proportion is fully sufficient, and no useful end can be obtained by using more.

The action resulting from the contact of the iron and iodine having ceased after brisk agitation, we take advantage of the heat produced, and immediately raise it to the boiling point over a rose gas-burner, or in any other convenient way: we stop the ebullition when the froth becomes white, and allow the liquid to cool down to about 100° Fahr., when we immediately pour in the solution of carbonate of potash con-

tained in the bason, and mix by agitation, taking care to remove the hand occasionally from the mouth of the flask, to allow of the escape of carbonic acid, which is slowly given off; in doing so, the operator must be careful to give vent to the pent-up gas on the side of the flask farthest from his person, otherwise he will run the risk of having his clothes disfigured with red stains from the ferruginous liquid.

If the mixture be made at a somewhat higher heat, the escape of gas is so rapid, that there is great danger of the liquid boiling over, and thus leading to considerable loss; on the other hand, if the solutions be mixed at a lower temperature, the precipitate is very slow of subsiding, and this interferes with and retards the process.

We now fill up the flask to the commencement of the neck with distilled water recently boiled, agitate, and set aside to allow the precipitate to settle; our reason for filling up the flask to its narrowest part is, that as small an extent of surface as possible may be presented to the decomposing action of the air.

We have now in the flask a solution of iodide of potassium, with an excess of iodide of iron, together with a bulky white precipitate of protocarbonate of iron.

To neutralize the excess of iodide of iron, either of two methods may be adopted: We may at once proceed to neutralize the excess by adding, gradually, the solution of the carbonate from the test glass, agitating after each addition, until the liquid restore the blue color to litmus reddened with a single drop of muriatic acid to about six ounces of water. This can be easily managed by dipping the point of a glass rod into the mixture in the flask, and then applying it to one of a number of small slips of the paper placed by the side of the operator. We give the preference to the other method.

After the precipitate has sufficiently settled to give a clear liquid, we pour in a little of the solution of the alkaline car-

bonate, and as there is an excess of the iodide of iron, a white precipitate is immediately produced. We now agitate the flask briskly, to mix the solutions thoroughly, and likewise that the heavy sediment may envelope the very light precipitate last produced, and carry it down quickly, so as to leave the liquid clear, otherwise the liquid would remain thick and cloudy for a very long time.

By proceeding as directed, the liquid in a few minutes becomes quite transparent; we then add more alkaline solution, and proceed as before. We continue adding the solution, but more cautiously towards the end, till no reaction is produced on a fresh addition.

After complete subsidence of the sediment, we pour off the liquid into an evaporating bason, and press the precipitate strongly in a cloth; we then break up the mass in about six ounces of distilled water, press again, and add the liquids to that already in the basin, and evaporate till near the point of crystallization.

We may here remark, that we prefer pressing through a cloth, to the tedious process usually recommended of washing the precipitate on a filter, with an abundance of water, till every trace of iodide be removed from it, and thus increasing unnecessarily, and to a large amount, the quantity of liquid to be evaporated; and we feel persuaded that we will be supported in our view of this matter by every practical man, and for the following reason:

After pressing strongly the precipitate, there is not at the most more than an ounce of liquid left; and as the whole amount of the liquid was six pints, or 120 oz., and contained in solution 11.8 oz., or 5664 grains, of iodide, there could only be the 1-120th of that quantity in what was left, that is 47 grains; but as the precipitate was diffused through six oz. of water, the whole seven oz. would contain no more than 47 grains; and, on again pressing, only the seventh part would be left behind, which is somewhat less than seven grains.

A moment's consideration will show that the value of this could never compensate for the time spent and fuel consumed in filtering and evaporating three pints of liquid, which is the amount ordered by the London college for the quantities used in our process.

To return from this digression: having concentrated the solution to the extent mentioned, it will be found almost invariably that the liquid shows a strong alkaline reaction; for however carefully the alkaline solution may be added, it is almost impossible to avoid an excess; this excess must therefore be remedied, and the method we adopt for this end is the following:—

We prepare, in a Florence flask, a solution of iodide of iron, from ʒiij. iodine, ʒj. iron filings, and ʒvj. of water; with this proportion of cold water, the action goes on with perfect safety, but, with very little less, the heat developed is so great that the liquid almost instantaneously enters into uncontrollable ebullition, and the whole contents of the flask are expelled with a sort of explosion. In using the proportions we have adopted, the heat produced is nearly sufficient to bring the solution to the boiling point, so that a few minutes' application of the gas-flame renders the liquid sufficiently clear.

We do not think it useless to remark here, that the cautions commonly given, not to apply more than a very gentle heat, do not appear to us to be well grounded, and proceed from a needless fear of the loss of iodine; the attraction of iron and iodine in the presence of water is so energetic that they combine almost instantaneously; and, after the action, the quantity of iodine, in a free state in the liquid, must be very small; and we should conceive that there is less likelihood of a loss of iodine by applying the heat rapidly than otherwise, inasmuch as the currents in the liquid are rendered more rapid, and thus every point is brought successively in contact with the iron diffused in this way through the fluid; and, in our opinion, the clearing of the liquid re-

sults more from the action of the iron than the expulsion of free iodine by the heat. At any rate, however rapidly heat may be applied, there is very little escape of iodine, and we never found that we obtained a less quantity of iodide of potassium when a quick heat was used than when it was more gentle.

Having now prepared a strong solution of iodide of iron, which is done in a few minutes, we allow it to settle a little; then pour it into a phial from the sediment without filtration: about an ounce of water may then be poured into the flask, and the sediment washed with it, and, after subsidence, poured into the concentrated solution of iodide of potassium. We now continue adding gradually more from the phial, till the liquid ceases to restore the blue color to reddened litmus.

After heating to aggregate the precipitate, we filter the liquid, washing the precipitate properly; for this purpose we use a double filter, the liquid being so dense that a single one would inevitably give way under its weight: unite the liquids and evaporate to dryness, and fuse the dry salt in an iron pot provided with a cover; the fusion may be easily accomplished with a brisk open fire, and care must be taken not to continue the heat a single instant after complete fusion has been effected.

Without the application of a heat sufficient to fuse the iodide, we cannot, without great difficulty, obtain it free of color, probably arising from excess of iodine, and possibly organic matter; but in this way they are both completely removed.

By dissolving out the iodide and filtration we get a perfectly colorless solution, and by successive concentration and cooling, we obtained a perfectly pure and colorless iodide nearly to the very last.

Whenever the crystals begin to show the presence of impurities, which can be easily known by the form and appearance they present, or their partial solubility in alcohol,

we evaporate to dryness, and purify the residuum with alcohol, or reserve it for this purpose till a sufficient quantity is collected.

We obtain the iodide of potassium in beautifully regular crystals, by covering the bason, after due concentration, with a plate, which prevents rapid evaporation from the surface, and the consequent formation of a crust, placing it on a bad conductor, such as a piece of charred wood, and surrounding the whole with several folds of a dry cloth, formed of some good non-conducting substance ; in this way the liquid cools very slowly, and allows time for the solid particles to arrange themselves in a regular manner.

A saturated alcoholic solution of the iodide, which had been used for its purification, after standing aside for about twelve months in a bottle loosely corked, had deposited, at the bottom of the bottle, a mass of loose acicular silky crystals.

It is almost invariably asserted in chemical works, that the iodide is a deliquescent salt; this is not the case when it is perfectly pure and free from excess of the very deliquescent carbonate of potash. We have kept a pure specimen crystallized from alcohol in an open dish, exposed to all conditions of the atmosphere for weeks, without appearing damper than when just taken from the stove.

Pharmaceutical Journal.

ART. LXXIII.—AMBERGRIS.

By Mr. Payne.

It is well known that the nature and origin of ambergris were, for a very long period, quite unknown. "Authors differ," says Dr. Kæmpfer, "widely in their opinion both as to its origin and production; nor do they even agree as to what kind of substance it properly is. Some take it to be a bituminous substance, others a sort of earth or clay; some think it is a sea-sponge, others the dung of birds. Dr. Denys, in 1672, asserted, that 'ambergris is a mixture of wax and honey, gathered upon the sea-coasts by bees, which, by being digested by the heat of the sun, falls into the sea, where by the motion of the waves and admixture with saline particles, it becomes changed into this precious article;' but the most generally received opinion is, that it is a kind of bitumen generated in the bowels of the earth, or a subterraneous fat grown to the consistence of a bitumen, which by subterraneous canals is carried into the sea, where, by the heat of the sun and admixture of saline particles, it becomes ambergris."

After refuting the assertion of Dr. Denys, by several arguments not necessary to mention, Dr. K. goes on to describe its varied appearance as at that time usually met with. He tells us, that he himself saw a fine greyish specimen, weighing 180 lbs. Dutch, which had been divided into four parts; another piece found in 1693 was sold by the king of the country for 11,000 rix-dollars, about £2000 sterling, to the Dutch East India Company; it was sent to Amsterdam, where it was then kept, and it weighed 185 lbs.; it was of a grey color, in shape not unlike a tortoise with the head and tail cut off, and was bought on condition that, if found

adulterated, it was to be returned (certainly a very good precaution, but not so easily to be accomplished.)

Dr. K. next speaks of the adulterations to which it is liable, and gives some modes for detecting them, all of which Mr. Payne fully detailed.

Mr. Payne then proceeded to observe, that it is usual to prefer ambergris which, on fracture, presents a greyish and somewhat speckled appearance; unctuous when pressed between the fingers; smell somewhat resembling old cow-dung; tolerably soluble in rectified spirit, to which it imparts its odour, and in proportion to which solubility its quality or purity may be determined; depositing from the solution, when dried off, a whitish and fatty residuum.

Ambergris is now well known to be obtained from the intestinal canal of the cachalot, or sperm whale; so that the name of *whale's dung*, which Kæmpfer tells us the Japanese have given to it, is by no means an inappropriate one. It is usual to meet with extrinsic impurities in it, which have been mistaken for shells, but which are in fact the beaks of the *Sepia moschata*, on which the sperm whale feeds. This is a strong confirmation of the common opinion of the intestinal origin of ambergris.

According to some writers, it is regarded as hardened fæces merely; while others consider it to be a product of disease. Mr. Beale, in his *Natural History of the Sperm Whale*, (1839,) observes, that on one occasion, while in the North Pacific, he had the curiosity to collect some of the semi-fluid fæces which floated from the carcase of a whale, while the men were cutting it up; and which, on being dried in the sun, bore all the properties of ambergris. On the other hand, Mr. F. D. Bennett, in his *Narrative of a Whaling Voyage round the Globe*, (1840,) declares, that "ambergris is a morbid concretion in the intestines of the cachalot, deriving its origin either from the stomach or biliary ducts, and allied in its nature to gall-stones, or to the bezoars of herbivorous animals; while the masses found

floating on the sea are those that have been voided by the whales, or liberated from the dead animal by the process of putrefaction.

"It is not common," he adds, "for the whaler to find ambergris in the cachalots he destroys; nor does he, indeed, make a very rigid scrutiny of the intestines in search of it, unless a suspicion of its presence be excited by some marked peculiarity in the whale, as a torpid and sickly appearance, and the animal failing to void liquid excrement, as is usual with healthy whales, when alarmed by the sudden approach to the boats, or struck by the harpoon. Some years ago, the whale-ship 'Mary,' of London, discovered a dead cachalot floating on the ocean, and as there were no injuries on its body to account for death, that event was attributed to disease; consequently the whale was searched for ambergris, and the captors were gratified by finding a very large quantity of that valuable drug impacted in its bowels."

The Greek merchants are purchasers of ambergris, in some quantity, it is believed for use in their religious ceremonies; and Mr. Payne stated that he had found their judgment useful in deciding on its quality, and had occasionally met with some small pieces in their possession of considerable fragrance, and of apparently a different species to that usually met with in our markets.

Although ambergris is seldom used in this country, excepting as a perfume, it is esteemed as a valuable medicine in some eastern countries.

Mr. Payne further observed, that a very spurious article is sometimes met with—which may be readily detected on the slightest examination of its external character by any one who has seen specimens of the genuine kind.

Ibid.

ART. LXXIV.—ON HEMIDESMUS INDICUS.

By Mr. Jacob Bell.

(Syn. *Periploca indica*, Wild. *Asclepias pseudosarsa*, Roxb.)

The root of *Hemidesmus indicus* has for some years been sold in this country under the name of *Smilax aspera.* It is imported in considerable quantities from India, where it is called *country sarsaparilla, nannari,* or *nunnarivayr.* Dr. Ashburner, who introduced it to the notice of the profession in this country, gave it the name of *Smilax aspera,* on the authority of Ainslie; but it is evident that a misunderstanding existed respecting the identity of the plant, as the roots are essentially different, which will appear from an examination of the specimens on the table. The *Smilax aspera* is a tough, cylindrical root, having very little taste or smell, and covered with a thin, smooth, brown bark, which also is insipid. The root of *Hemidesmus indicus* is also cylindrical, covered with a brown bark, and is similar in dimensions; but it is more tortuous, rugose, and is furrowed longitudinally. The bark is very thick, brittle, and aromatic, and constitutes above half the substance of the root. By bruising in a mortar, the bark crumbles off, and may easily be separated by sifting, as the wood, although not nearly so tough as that of *Smilax aspera,* is much less brittle than the bark. The aroma, which is very strong, and similar to that of new hay, resides chiefly in the bark; but even the wood possesses enough of this peculiar character to distinguish it from that of *Smilax aspera.*

Mr. Garden, who examined the root of *Hemidesmus indicus* in the year 1837,* discovered in it a peculiar volatile substance, which he obtained in a crystalline form, and

* *London Medical Gazette,* vol. xx., p. 800.

which he termed *smilasperic acid*, (in the belief, which at that time prevailed, that the root was that of *Smilax aspera.*) Dr. Ashburner published a paper on this root in the *London and Edinburgh Physical Journal*,* in which he speaks in high terms of its efficacy in many of those cases in which sarsaparilla is recommended.

It has generally been administered in the form of a syrup, but an infusion and a decoction have also been used, the proportions being the same as those adopted in the decoction of sarsaparilla, namely, two ounces of the root to a pint of water.† There is no recognized formula for the syrup, unless that of the Pharmacopœia for syrup of sarsaparilla be taken as the standard, which has been proposed in consequence of the supposed similarity of the remedies. It is particularly necessary, however, in making the syrup of *Hemidesmus indicus*, to avoid a high temperature, which would dissipate the volatile principle of the root, and on this account, the following method of manipulation has been adopted with a satisfactory result:—

Take of the root of *Hemidesmus indicus*	1 lb. avoirdupois.
Refined sugar - - -	1 lb. "
Distilled water, about - -	3 pints.

Bruise the root sufficiently to separate the bark by sifting, and reject the wood. Add to the bark an equal bulk of washed sand, moisten with water (three or four ounces) so as to ensure its intimate mixture, and pack it well in a displacement apparatus. Add as much water as it will absorb, macerate for four hours, and displace the liquor by the addition of a further portion of water. Reserve the first six ounces. Add more water until it passes through tasteless. Then evaporate the latter portion to three ounces, in which, with the addition of the first six ounces, dissolve the sugar with as moderate a heat as possible. By this means, the

* Vol. lxv., p. 189.

† *Dr. Pereira's Elements of Materia Medica*, p. 1289.

first portion of the liquor, which contains the major part of the aroma, is not subjected to the process of evaporation, and the result is twenty ounces, by measure, of a syrup possessing all the aromatic properties of the plant.

Ibid.

ART. LXXV.—NEW TEST FOR STRYCHNINE.

By Eugene Marchand.

It often hapens that the chemist, when called upon to decide a medico-legal question, experiences some difficulty in proving the presence or nature of certain poisonous substances, either because he cannot procure a sufficiency of the poison, or else the re-agents serving to characterise them are too little sensitive, or do not offer that degree of precision as to allow you to pronounce with certainty in a capital case. Among the organic alkalies thus far known, we are all aware that strychnine is the most poisonous. Hence the discovery of a reaction which enables you to detect with certainty very minimum quantities, becomes a desideraatum.

I believe I have attained this object by the following process, which is so sensible as to give a yet very appreciable reaction, even when you operate upon an imponderable quantity of sulphate of strychnine.

When you triturate a very small portion of strychnine with a few drops of *concentrated sulphuric acid containing a hundredth of its weight of nitric acid*, the strychnine disappears without giving rise to any perceptible phenomenon: but if you add to the mixture merely an atom

of *peroxide of lead*, it immediately developes a magnificent blue color, which rapidly passes to violet, then gradually to red, and finishes lastly, after several hours, by turning to canary yellow. This reaction is characteristic of strychnine, as it has been impossible for me, up to the present time, to find a substance which acts in a like manner, under similar circumstances.

When you act upon infinitely small quantities of strychnine, it is preferable, in order to render the reaction more sensible, to triturate, in a dry state, a few particles of peroxide of lead with the organic alkali, then to let fall upon the mixture a single drop of the acid liquid. You will then distinctly perceive, in a manner not to leave any doubt upon the mind, the series of coloration I have above described, even when acting upon a portion of strychnine imponderable, but approximately estimated at one thousandth of a grain. A. D.

Jour. de Pharm. et Chim.

ART. LXXVI.—OBSERVATIONS ON MUSK.

This substance is found secreted in a bag attached to the male musk deer, whose habitat is in the mountainous Kirgesian and Sangorian steppes of the Altai, on the river Irtysch. It exists also in Mongolia, Thibet, and Butan or Bontan, as far as Tonquin, and generally on the mountains of Eastern Asia, ranging between 30° and 60° of latitude.

In trade two distinct species of musk are known, comprising the Chinese Tonquin, Thibetian or Oriental musk, and that which includes the Siberian, Cabardinian, or Russian musk. These varieties, the one Russsian and the other Chinese, differ materially both in the external appearance of the bag and the color of the hair which covers it, as well as in their chemical and physical properties, and different effects on the human constitution.

These differences exist chiefly on account of the difference in climate which the animals inhabit, and the food which such variations in temperature occasion. Dr. Göbel is of opinion that these different properties of Chinese musk, as compared with the Russian, should be attributed to the difference of treatment which they undergo in China, and he considers that the Chinese musk is the natural product after it has been subjected to the ingenious adulterations of the Chinese. The following are the reasons for this supposition:—

Irbit, a small town of Asiatic Russia, known chiefly for the considerable barter-trade which is there carried on in the month of February, between Russian, Bucharian, and Chiwinzian tribes, with Persian, Armenian, and other Asiatic nations, is the main market for Siberian musk. It is less frequently taken to the market of Nischnei Novgo-

rod. The Asiatics bring to Irbit the musk bags enveloped in the original grayish-white skin, as cut from the musk deer, and sell them either to the Russians, who carry them to St. Petersburg and Moscow, or they dispose of them to Russian traders, who carry on a commerce with China by Kjachta.

The Russian merchants, who bring the musk from Irbit to St. Petersburg and Moscow, trade only between these towns and Irbit; but those who carry it to Kjachta trade between the said town of Kjachta and Irbit.

In case the price of musk is remunerating at St. Petersburg and Moscow, then the Russians who trade there purchase the musk bags, and pay good prices; on the other hand, when it is low in these places, the Asiatic finds his customer in the trader to Kjachta. Sometimes it is brought to St. Petersburg in large and sometimes in small parcels, occasionally packed in chests, whilst at others it is loosely carried in bags of leather or felt, and sold generally to druggists.

The price of Musk at St. Petersburg is regulated by the quantity of stock in hand. The Russian trader procures European wares with the product of his sale, which wares are destined to procure at Irbit a further supply of the drug. At St. Petersburg it is packed in tin caddies, hermetically soldered, and when exported these are packed in small wooden cases.

The Irbit musk is invariably enveloped in the grayish-white belly skin, and the bags are separated when it is sent to St. Petersburg, this being done only after it has been sold to the St. Petersburg trader; for a bag accompanied with the skin rarely arrives at St. Petersburg. If, however, the musk is sold to those traders who proceed with their wares for the Chinese market via Kjachta, this appendage is indispensable, because the Chinese, who exchange tea for it, would not purchase it except in its original state. From

Kjachta it is taken into the interior of China, and the process of adulteration it there undergoes is entirely unknown; but it is a fact, the authenticity of which is indisputable, that no Russian musk bag is ever re-imported from China, via Kjachta, the only trading mart between Russia and China; and further, that not a single bag of Chinese musk ever arrives in Russia via Kjachta.

In one year, 300, 400, and even upwards of 500 lbs. of Russian musk have been carried to China by Kjachta. In such years it may be presumed that but little musk arrived at St. Petersburg, where the rise and fall of the market price is governed by the quantity imported.

From St. Petersburg and Moscow there is annually exported a quantity of Russian musk, amounting to an average of 500 lbs. Perhaps one-half of this quantity is destined for the London market, where more especially the smallest bags are in demand, whilst the remainder is distributed amongst other European markets, more especially those of Holland and Germany, where the greater part is consumed.

The Russian musk, when exported from Russia, is always genuine and unadulterated; the bags never being opened, are consequently never sewn, or closed in any artificial manner. Sometimes it is obtained so fresh that moisture may be expressed therefrom by cutting through the fleshy side of the bag. The interior mass is frequently of a soft and pappy consistence; externally, however, the bags are perfectly dry.

Dyrssen, an eminent Russian merchant, proved to Dr. Göbel, by his books, that he annually exported, on an average, about 200 lbs. of Russian musk, and he stated that through other houses at least a similar aggregate quantity was sold; and lastly, from Moscow, in the winter, there was sent, via Brody, to Vienna, and through other channels, at least 100 lbs., giving an annual total of 500 lbs. of Russian musk, which was rather below than above the average quantity exported.

That which is termed Tonquin or Chinese musk comes into the market only through the London trade, and by no other channel; although much of this is consumed in Russia, no bag being ever received via Kjachta, but always imported directly from London. These Chinese musk bags are found, on examination, invariably to have been opened, and more or less carefully glued together; sometimes indeed the stitches are visible by which they are held together.

We have the assurance of Dyrssen, that during the many years he has been engaged in trade, although he has frequently received quantities of from 100 to 200 oz. at a time from London, yet in no case whatever has he met with a bag which had not been opened, and closed with more or less ingenuity. He believes also that he has recognised the Siberian bags, although somewhat modified. Whether the Chinese musk, in its peculiar package, is received in that state at the English factory at Canton, as is most probably the case, or whether it is there made up, we are not in a position to state. Dr. Fr. Göbel relates, that in the year 1825 he received through Jobst and Klein of Stuttgard, a Chinese musk bag, to which was adherent a portion of the skin attached to the belly; this Dr. Göbel opened in the presence of the eminent naturalist Oken, and it was represented by Ratzeberg and Brandt in their description of officinal animals, and of which Oken gave an account in his "Isis," and which appeared also in Kastner's "Archives." This bag, which the Dr. has still in his possession, was of the same form and in color and size of the hairs precisely similar to the Russian musk bag, with which he had an opportunity of comparing it whilst on a visit to Russia. The contents, however, of this musk bag differed materially, in their chemical and physical properties, from those of the pure Siberian musk bag. Buchner, in his "Repertory," has given a description of a musk bag, which coincides with

that in Dr. Göbel's possession. The weight of grain musk from this bag was 225 grains, and cost 30 thaler,—about £4 10s.

If we take a Chinese musk bag, with its partially bald surface and yellowish-brown hairs here and there cut off, and soften the same by digestion in warm water, we perceive pretty plainly that it has been subjected to artificial changes. The external skin is tender, and may be easily torn, as if it had been destroyed by partial decomposition; the hairs have either fallen off or been removed by force; indeed the longer hairs clearly appear to have been cut off.

Why do not the musk bags from China arrive as perfect as those from Russia? Because the contents have been removed and the bags refilled, as may be distinctly perceived by the circumstance of those hairs which surround the interior small opening which is found on the hairy side of the bag, immediately before the genital canal, being depressed; whilst in the Russian musk bags these small hairs are found standing obliquely, and protruding in and between the secretion. It is possible, although not at all probable, that the musk deer, which abound in Thibet, Butan, &c., may possess musk bags of a perfectly distinct character from the Russian, but no trustworthy reference or practical judge has ever witnessed the removal of such a bag from the living animal, or described it or its contents. That the grain musk of the Chinese musk bags which have been brought to Europe differs very much in its effects, as well as in its physical and chemical characters, from the pure Siberian, has been ascertained; and that it likewise acts with more energy on the living economy when administered internally. All the different chemical investigations of musk, for which we are indebted to Buchner, Wetzlar, Oberdörffer, Thiemann, Blondeau, Guibourt, Geiger, and Reimann, &c., taken together, afford very few hints in reply to those questions, which involuntarily present themselves, in refer-

ence to the two different kinds of musk, so far as regards their chemical and mercantile relations.

Taking, therefore, the most essential points of the preceding communication:—1st, that the Russian musk is always sold in perfect bags, and exported in considerable quantities to China and to London; 2d, that from China to Russia no direct exportation of musk takes place; 3d, that the Chinese musk can only be obtained via London; 4th, that the Chinese musk bags never arrive unopened; 5th, that it appears most undoubtedly that the mass has been taken out and replaced; 6th, that the external appearance of the bags proves sufficiently that they have undergone artificial treatment; 7th, that frequently the secretion, apart from the bag, is imported from China, leading to the inference that a sufficient number of bags cannot be obtained, wherein to put the quantity increased by adulteration; taking all these reasons into consideration, we think the conclusion announced at the commencement cannot be avoided, viz. that the distinctly marked difference of the Chinese from the Russian musk, if not wholly, is at any rate chiefly, caused by the treatment which it undergoes in China, and therefore that Chinese musk is the natural product after it has been modified by artificial means.

It is a fact worthy of remark, as showing the ignorance which exists in reference to the places whence products are obtained, that notwithstanding the fact that London receives the greater quantity of Russian musk, yet that in the Trades' List and Prices Current no mention is ever made of Siberian or Cabardinian musk.

In reference to the quantity of musk on which duty has been paid, we find, on referring to the Customs' official documents, that in the year 1842, up to June 28th inclusive, the duty of 6d. per oz. was paid on 1643 oz., whilst during the same term in 1841 only 501 oz. were cleared.

At the port of London alone, from June 1841 to June 1842, duty was paid on 969 oz.—*Lon. Chem. Gaz.* Nov. 1, *from Polytechnic Review,* Oct. 21, 1843.

ART. LXXVII.—OBSERVATIONS ON LEECHES.

By Otto Köhnke.

In consequence of the premium offered by the French Society for the Encouragement of Arts, in the year 1840, for the best observations on leeches, the most advantageous methods of rendering them fit for frequent use, and for multiplying them in artificial ponds, I was induced to make the following experiments:—

Every one who has had much to do with the treatment of leeches will be aware of the great trouble and care required to render them serviceable a second time. I have succeeded in making them fit for use three, four, and even five times, by a method which I am not aware has hitherto been employed. The results of my experiments I will communicate in the present article.

In these experiments different species of leeches were employed, for instance—

Sanguisuga interrupta, M. T.
Sanguisuga officinalis, Savig.
Sanguisuga medicinalis, Savig.

which are described in every good work on zoology.

S. medicinalis was obtained from Jutland, where it still occurs in plenty.

The treatment was as follows:—Each kind was kept in an open wooden jar, containing a sufficient quantity of water and some fresh plants of *Calamus*. The border was rubbed in on the interior for two inches with dilute sulphuric acid. As soon as the leeches had been employed they were thrown into a vessel in which were placed some beech-wood ashes; in a very short time they had vomited all the blood, and were then removed as quickly as possible, in order not to weaken them too much, on to a seive, and well washed; and

after having undergone this treatment they were conveyed into a vessel containing water, and coarsely-pounded, well-washed charcoal, and here left for the space of twelve hours, upon which they were removed into the above-mentioned jars.

In this manner I obtained with 180 leeches (60 of each kind) the following results :—I may observe that they were employed at intervals of from three to four weeks, from July to October of the same year.

S. interrupta.

	Leeches employed.	Number which died in the interval.	Observations.
1st time	60	7	The first time 2 would not suck, the second time 5, and the fourth time 3, after which the remainder died within 8 days.
2d "	53	31	
3rd "	22	14	
4th "	8		

S. officinalis. Hungarian Leech.

1st time	60	9	The second time 3 would not suck, the third time 2, and the fourth time 1, the remainder died within 19 days.
2d "	51	37	
3rd "	14	10	
4th "	4		

S. medicinalis.

1st time	60	4	The first time 1 would not bite, the second time 6, and the fourth time 7, the remainder all died within 5 days.
2d "	56	18	
3rd "	38	19	
4th "	19	10	
5th "	3		

From these results *Sanguisuga medicinalis* would seem to deserve the preference, but the shortness of the transport may perhaps account for this considerable difference.

Other experiments have at the same time taught me that when the leeches are employed only at intervals of from eight to ten weeks they preserve far better.

The treatment of leeches in the manner above described would lead, especially in large hospitals, to a considerable saving of expense. It need scarcely be mentioned that this plan cannot be adopted with those which have been applied to individuals suffering from contagious diseases. For such cases I may however direct attention to the fact, that when a portion of the foot of the leech is cut off while it is sucking, the leech then, instead of removing as usual 1 or $1\frac{1}{2}$ oz. of blood, will take 3, 4, and even 5 oz. Should this be confirmed, it will be possible to effect with one leech what otherwise would require two or three.

With the constantly-increasing rarity and expense of the officinal leech, it is certainly desirable to draw more attention to the horse-leech, *Hirudo vorax*, which is met with in many districts in considerable numbers.

I have also made some experiments with these leeches, and have generally obtained similar results. Thirty specimens of ordinary size were employed, and I never observed any serious inflammatory wounds, or other ill consequences, result from their use. Even were they not to be employed on the more tender parts of the body, they might still be made use of in very many cases.

I will now add some observations on the preservation and breeding of the leech, and also a word or two respecting the difficulty which sometimes occurs of bringing the leeches to bite.

With respect to the preservation of leeches, I have frequently had occasion to keep them, even in very considerable quantities, for half a year and more in pure water, in which were placed some plants of *Calamus*, renewing the water every eight days in summer, and every three or four weeks in winter. This plan I consider to be the best, especially with small quantities.

I cannot advise the use of loam, turf, or patches of grass intermingled with roots of *Calamus*, which are frequently had recourse to, as I have learned from experience that it is

not only difficult to cleanse the vessel under such circumstances, but that in doing this and replacing these substances, which must be done at least every three weeks in summer, a number of leeches are wounded and crippled.

The vessel which I employ for preserving large quantities is constructed of *beech-wood*, and is about 4 feet high and as many in circumference. In it is placed grass turf, arranged on shelves one above the other for three quarters of its height, and in a funnel-shaped form, so that the water may easily run off. It contains a false bottom, below which is a cock, with an arrangement to prevent the leeches from escaping, through which the water may be drawn off. The lid consists of a wooden frame, with varnished iron-wire net-work with rather wide meshes. The inside of this frame is moistened from time to time with sulphuric acid, which prevents the leeches from creeping on the sides of the vessel. The acid does them no harm, but appears on the contrary to prevent their dying so easily, and moreover to render them sooner fit for use. In a vessel or pail of this kind from 3000 to 5000 leeches may be kept.

With respect to the breeding of leeches, I obtained in autumn from 4000, kept during last summer in a vessel of the kind described above, about 700 young leeches.

One of the greatest inconveniences with leeches is when they refuse to bite, and although considerable attention has been paid to this subject, most of the means advised under such circumstances are attended with little success. Martius, in his 'Zoology,' mentions several, one of which I have found to do good service. As it is always to be had, it deserves to be better known. When weak beer is warmed to about 100° Fahr., and the leeches left for a few minutes in it, they suck with the greatest avidity. Those which will not suck after this treatment I have almost always found to be ill.—*Lond. Chem. Gaz., Archiv der Pharm.*

MINUTES OF THE PHARMACEUTICAL MEETINGS.

October 2d, 1843.

Professor Carson in the Chair.

The minutes of the previous meeting were read and adopted.

Augustine Duhamel called the attention of the members to a root found intermixed with senega, in the proportion of one-third, presenting characteristics different from those of that drug, and easily distinguishable from it. As the subject possessed some interest, it was referred, for consideration, to Augustine Duhamel and William Procter, Jr.

Joseph C. Turnpenny exhibited a reddish brown ferruginous powder, deposited from a spring in New Jersey, near the Delaware water gap, together with some of the spring water. The latter has acquired a local celebrity as a remedy in diseases of the bladder. The hasty examination to which it had been submitted elicited nothing of interest in its composition.

A specimen of the reticulated inner bark of the lace tree, and one of very old oil of lemons, were presented by the same. The color of the oil was reddish brown, consistence thick and oily, odor terebinthinate, and taste disagreeable, little resembling oil of lemon. It was supposed to have been adulterated with copaiba, but the probability is greater that mere age was the cause of its present condition.

Prof. Carson informed the meeting that there was in the market a volatile oil, called "oil of cedar," and inquired if the source of it was known to druggists. It is stated to have been productive of poisonous effects when taken internally.

Wm. Procter, Jr., presented specimens of the fruits of *Mimosa scandens* and *Pisum cordatum*, from the West Indies.

November 6th, 1843.

Professor Carson in the Chair.

The last minutes were read and adopted.

The Journal de Pharmacie et de Chimie and Journal de Chimie Medicale, to September; the London Pharmaceutical Journal to August, and Silliman's Journal for October, were received.

The Committee appointed at last meeting presented their report, which was read.

Professor Carson read a paper on an article purporting to be "Texas Sarsaparilla," but which he believed to be the stem and branches of a vine-like climbing plant. It was referred to Thomas P. James and Prof. Bridges.

A paper on the "Ergotine" of M. Bonjean, by Augustine Duhamel, was read by the Secretary, and was committed to Ambrose Smith and H. W. Worthington, as reporters.

A paper on the Gunjah or Indian Hemp of the East Indies, compiled by Augustine Duhamel, was read, and given in charge to William Procter, Jr. and John H. Ecky, for examination.

A specimen of Citrate of Iron and Quinine, prepared by Lawrence Turnbull, was presented to the meeting. It was in the form of brilliant scales of a reddish brown color, very like Citrate of Iron. Its taste is slightly chalybeate and bitter after remaining in the mouth for some time, but it is not very soluble. The following is an outline of the process for preparing it:—Make an acid citrate of quinine, by adding quinia to a hot solution of citric acid, and afterwards an equivalent quantity of citrate of iron. When the solution is complete, evaporate it to a syrupy consistence, and spread on glass to dry.

A specimen of the volatile oil of *Juniperus virginiana*, and the fruits of the *Bignonia echinata*, *Annona glabra*, and *Annona squamosa*, were presented by William Procter, Jr.

December 4th, 1843.

Professor Carson in the Chair.

The minutes of the previous meeting were read and adopted.

The Committee having in charge the paper of Dr. Carson on Texas Sarsaparilla, reported in favor of its publication.

The paper of Augustine Duhamel on the Ergotine of M. Bonjean, was recommended for publication by the Committee.

The commission to whom the essay on "Indian Hemp" was submitted, approved of its insertion in the Journal.

A paper containing observations on cold cream, by Lawrence Turnbull, was read by the Secretary and referred for consideration to W. Procter, Jr. and Thomas P. James.

A paper, being extracts from the observations of M. Deschamps on Pommades, translated by Augustine Duhamel, was read and referred to the publishing committee.

A note from Augustine Duhamel was read, on Canchalagua, a South American remedy, brought from Monteroy by Dr. N. C. Barrabino, of the United States Navy. It is the *Erythræa Chiliensis*, a detailed account of which is given in the 6th volume of the American Journal of Pharmacy, by Dr. Joseph Carson. According to Dr. B. it occurs abundantly in Chili and California. It is much employed by the natives in fevers, particularly intermittent, and as a pleasant bitter tonic and diuretic. It is administered in the form of infusion.

Dr. Carson observed that several barrels of the Erythræa were brought to this city from South America, some years ago, by Dr. Ruschenberger, U. S. N., and employed at the navy yard of this city.

A specimen of Cucumber Ointment, made by Augustine Duhamel, was presented for examination. It is prepared by expressing the juice of the green fruit, filtering and beating it for a long time with pure lard, until the fatty matter imbibes all the odor and taste of the juice. The excess of fluid is then separated, the lard melted and preserved in well stopped vessels, covered with rose water.

William Procter, Jr., asked the attention of the members to the results of some experiments he had made on the bark of *Betula lenta.* 1st, That the volatile oil of *Betula lenta* is identical with that of *Gaultheria procumbens;* 2d, that there exists a peculiar principle in the bark, for which the name of *gaultherin* is proposed, which bears the same kind of relation to the oil of gaultheria, that amygdalin does to the oil of bitter almonds; 3d, that this principle, by boiling its solution with a fixed alkali, is decomposed, yielding a peculiar acid which remains combined with the base.

Edward Parrish presented a specimen of adulterated "Powdered Opium." He stated that it contained 3 per cent. of morphia and some meconic acid, and from its appearance probably contained chocolate.

A vial containing a few very brilliant iridescent crystals attached to its inner surface, was presented by Augustine Duhamel. It had formerly contained bisulphuret of carbon, all of which had evaporated through the cork and left the crystalline matter. Dr. Bridges suggested that it was silica.

Ambrose Smith called the attention of the meeting to a quantity of seeds which had been separated from flaxseed. Their color was deep orange yellow, and on examination proved to be the seed of an Allium, the garlic taste being very strong when they were chewed.

CORRECTION.—The leading Article in the last No. of the Journal (October,) was headed "On Hydrargyrum cum Creta, by Daniel Stewart, of Baltimore." The author is Mr. *David Stewart,* of Baltimore, so well known as a highly scientific Apothecary.

MISCELLANY.

Cyanide of Gold.—Mr. Defposses recommends to those who, in the the preparation of this substance by means of cyanide of mercury and a solution of chloride of gold, fear that some traces of the mercury might be retained with the gold, a resort to another method which succeeds equally well. It consists in submitting the hydrated oxide of gold, precipitated by magnesia according to Pelletier's method, to the contact of recently prepared and diluted hydrocyanic acid. In the first moment of the mixture the oxide of gold becomes blackish green, (constituting, perhaps, the cyanide of the oxide not yet obtained,) but in carrying the liquor to ebullition it soon takes a fine yellow tinge: all that is required then is to evaporate to dryness, by a very moderate heat, to obtain a very handsome and pure product, which needs no washing. For a cyanide of gold destined for medical use, this mode of preparation is to be preferred.—*Jour. de Pharm.*

Moxon's Magnesian Aperient.

℞ Magnes. Sulph.
Sodæ Carbon. *aa* lbj;
Acid. Tart. lbss. M.

The ingredients to be separately and well dried.

Powell's Pectoral Balsam.

℞ Rad. Ipecac. Contusæ, ℥iss.
Flor. Benzoin.
Ol. Anisi, ʒiij.
Spirit. Vin. Rectif. Olj.
Aquæ. Distill. Oj.

Macerate for fourteen days, and add—

Ext. Glycyrrhizæ, ℥vj.
Potass. Carbon. ℥iv.

dissolved in a pint of water, and add—

Tinct. Digitalis, ℥vij.

Freeman's Bathing Spirits.

℞ Lin. Saponis, ℥iv.
Spirit. Vin. Rectif. ℥j.
Tinct. Lavand. Co. gtt. xxv.
Ol. Rorismar. ʒss. M.

Robert White.

[We insert the above on Mr. White's authority, in the belief that the formulæ are correct, although we have no means of verifying them.—*Ed. Pharm. Jour.*]

Albumen.—The albumen of eggs owes its density, and its adhesive and stringy properties, to the presence and the cohesion of a great number of minute globules. (*Turpin on the microscopic examination of the globules of milk in a pathological state.*) These globules, according to the author, are nothing else than vegetable seeds, which are capable of germinating under the influence of moisture and heat. In a philosophical point of view, the white of egg, in its crude state, may be classed among the most tender and easily digested vegetables; but it also contains, as is known, a portion of sulphur, and it is this, probably, together with the yolk, that renders eggs so salutary to many convalescents. It has been observed, among other things, that the medicinal effect of eggs is remarkably deteriorated by boiling them with any fatty matter. This effect has been ascribed to the oxidation of the sulphur. *Ibid, from Annales de Thérapeutique*, August, 1843.

New Astringent Preparation of Rhatany.—By digesting rhatany root in sulphuric ether, a brown extract is obtained, which is perfectly soluble in distilled water, and causes a powerful sensation of astringency, followed by heat and dryness, when placed on the tongue. This extract, invented by M. Tissier, of Lyons, has been employed with success in that city in passive hæmorrhages, particularly those consequent on non-contraction of the uterus, occurring after prolonged labors

and miscarriages. It has also been used with advantage for leucorrhœa, blennorrhœa, gleet, &c. The dose in which it has hitherto been employed, is a table-spoonful of a mixture composed of from five to ten grains of the extract in six ounces of some appropriate vehicle. In leucorrhœa, topical injections are recommended of from two to five grains of the extract in a pint of barly-water. The presence of this preparation in the stomach, gives rise, generally, to a sensation of heat in the epigastrium, though this rarely proceeds so far as to become painful; great thirst, and a pulse often as full as in gastritis, also prevail. These symptoms are, however, transient, and rapidly quelled by lemonade, or other mild drinks. Should the injection irritate the urethra too greatly, it is only necessary to suspend its use for a short time.—*Ibid, from Gazette de Hôpitaux* and *Lancet.*

On the Colouring Properties of Aloetic Acid. By M. Barreswill.—Aloetic acid melted with colophony becomes of an intense blue color. The author has not, hitherto, been able to extract the coloring matter; but he remarks, that the resin, thus colored blue, dissolves easily in alcohol, in the essences, and in fatty bodies—which allows of its being used for coloring these substances, and also for injections. The coloring power of the aloes blue is very considerable. A few grains of crude aloetic acid, melted with about five drachms of resin, is sufficient to color a pound of fat.—*Pharm. Jour.*

Adulteration of sulphate of potassa.—Two or three cases have been recently published in the medical Journals of the Continent, in which the sulphate of potassa, prescribed to nursing women, has proved fatal, after causing a singular series of symptoms. M. Moritz of Neufbrisach, after briefly alluding to another case, in which this salt induced very serious symptoms, states that on examination he found it contained a notable quantity of the sulphate of zinc. He observes that the sulphate of potassa of commerce sometimes contains zinc, while other specimens contain both zinc and copper. The sophisticated salt is procured from Germany, where it is the secondary product of the manufacture of nitric acid, in which the sulphate of iron has been substituted for sulphuric acid. The ferruginous salt contains a variable quantity of zinc, copper, &c., according to the sulphurets from which it has been procured. Chemists purchasing this salt, therefore, instead of preparing it themselves, should examine and purify it. *Lond. Chemist.*

Gallic acid in menorrhagia.—Professor Simpson stated, that for the last year he had employed gallic acid in some cases of menorrhagia, with the most successful results. Like all the other remedies directed against that disease, it had also occasionally failed in his hands. Some of the cases which had completely yielded under its use, were of an old standing, and aggravating description. He gave it during the intervals, as well as during the discharge, in doses of from ten to twenty grains per day, made into pills. It had this advantage over most other anti-hemorrhagic medicines, that it had no constipating effect upon the bowels. He was first induced to use it, from finding a case of very obstinate menorrhagia get well under the use of Ruspini's styptic, after many other remedies had utterly failed, and from it being alleged that gallic acid was the active ingredient in that styptic. He suggested whether the anti-hemorrhagic properties of some of our common astringent drugs may not depend upon the gallic acid as much or more than upon the tannin which they contain, or upon the tannin becoming changed into gallic acid within the body.

Dr. Douglas Maclaclan mentioned, that in one case where he had tried it without success, it had acted as a diuretic.

London and Edinburgh Monthly Journal of Medical Science, July, 1843.

Anti-Epileptic Pills.

℞ Aqueous extract of opium - -	5 centigr.
Acetate of lead - - - -	20 ,,
Powder of hyosciamus - -	40 ,,
Gum syrup - - - -	q. s.

M. and F. S. A., a perfectly homogeneous mass, divided into eight pills of equal size, rolled in powdered orange leaves.

These pills are prescribed by Professor Récamier in cases of epilepsy. He directs one to be taken in the morning, and the other in the evening.

We follow up this formula with that which Dr. Leuret prescribes in the same cases, and of which he has had opportunity of proving the efficacy.

℞ Extract of stramonium - - -	1 gramme.
Extract of belladonna - - -	1 ,,
Camphor - - - - - -	50 centigr.
Opium - - - - - - -	,,

M and F. S. A., a homogeneous mass, to be divided into pills of 10 decigr.

One of these pills is taken *per diem*, at the commencement, and the dose is progressively increased, according to the effects produced, until it amounts to 15 and even 20 in the course of 24 hours.

London Chemist, from Gazette de Santé.

Ethereal Liniment of Oil of Ergot.

℞ Oil of ergot	- - - -	4 grammes.
Sulphuric ether	- - -	12 "

Mix and keep it in a well stoppered bottle.

This mixture is very probably more active than the following.

Ibid, from Jour. de Chim. Méd.

Liniment of Oil of Ergot of Rye.

℞ Oil of ergot	- - - -	4 grammes.
Oil of sweet almonds	- - -	12 "

Mix by simple agitation.

Ibid from Ibid.

Pills of Oil of Ergot of Rye.

℞ Oil of ergot	- - - -	1 gramme.
Yolk of egg	- - - -	1 "
Powder of mallow	- - -	1 "

M. and F. S. A., a perfectly homogeneous mass, to be divided into 20 pills, which should be silvered.

Ibid from Ibid.

New Purgative Ærated Sea Water.—An apothecary of Fecamp, on the coast of Normandy, has added to Pharmacy a new preparation, which he calls *eau de mer gazeuse.* He procures sea water at some leagues' distance from the shore, and from a certain depth; this he filters, to deprive it of its animal and vegetable impurities, which prevents its keeping wholesome, and he then charges it, like soda water, with carbonic acid. The preparation thus formed has been submitted to the French Academy of Medicines, and M. Royer has reported that it is a stronger purgative than seidlitz water; that it may be taken without repugnance, and is even agreeable to the taste of some; that no inconvenience has, in his experience, resulted from its use, and that it appears to exert a favorable effect in scrofulous patients. This testimony would seem to be decided and satisfactory enough on behalf of the preparation; but, as if litigation and splitting straws were to be the perpetual characteristics of French debates, the Academy would not suffer a recommendation of the article in question to proceed from it until the word *purification* had been expunged, and the *filtration* substituted in the detail of the process by which the animal and vegetable impurities are removed from the water.—*Ibid from Gaz. Méd.*

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